OCTOBER 3, 1960

American Machinist / Metalworking Manufacturing

A McGRAW-HILL Publication • Seventy-Five Cents

Testing machine checks and adjusts 480 circuit breakers an hour, see page 105

First details on
MAGNETIC FORMING,
page 95

Retooling for
'61 COMPACT CARS
Special Report, page 109

METAL SHOW ISSUE

Did you see Heald's NEW Model 171A Internal?

It's **LOADED** with new features for better production and easier servicing!

1. **Cross-slide Wheelhead Feed** assures maximum freedom from distortion under heavy roughing cuts—feeds faster and more accurately, with better size control.
2. **Right-Hand Feed Box** provides either constant feed or impulse feed that advances the wheel only at reversals of the table. Gives better finish and straightness on long bores. Manual override permits operator to fast feed or retract at any time.
3. **Infinitely Variable Compensation** for wheel wear, from 0 to .004", contributes to more constant size and longer wheel life.
4. **Front-Adjusted Wheel Dresser** is easier and safer to operate.
5. **Hydraulic Workhead Drive** provides greater range of speeds (from 50 to 1350 rpm) at the turn of a knob.
6. **Machine Base Contains No Heat-Producing Equipment** —hydraulic power and lube oil units are externally mounted, preventing thermal distortion and permitting easier access for servicing. Variable-displacement hydraulic system pumps oil only when it is *needed* to operate a cylinder or motor.
7. **Hydraulic and Electrical Cabinet** contains all hydraulic and electrical control mechanisms in separate dust-tight compartments—everything is easier to get at. Faster-acting miniature d-c solenoid valves speed-up cycles, last longer.
8. **Large Cabinet-Type Guards** cover entire work area and open automatically for greater safety, better coolant control and easier access for fixture changeover.

Heald Model 171A Internal Grinders are available in Size-Matic, Gage-Matic or Plain models for work with up to 8" swing and angular capacity up to 90°.

Ask your Heald engineer for complete information, or send for your copy of Bulletin No. 2-171A-1.

It PAYS to come to Heald

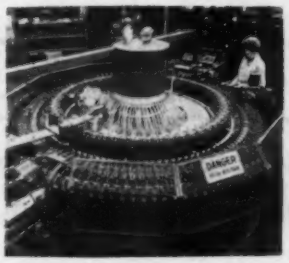
THE HEALD MACHINE COMPANY

Subsidiary of The Cincinnati Milling Machine Co.
Worcester 6, Massachusetts

Chicago • Cleveland • Dayton • Detroit • Indianapolis • Lansing • Milwaukee • New York • Philadelphia • Syracuse

HEALD

COVER:
Automatic machine designed and built by Westinghouse tests and adjusts circuit breakers. See page 104.



American Machinist / Metalworking Manufacturing

contents for October 3, 1960

VOLUME 104, NO. 20

Magnetic Forming . . . From the Naval Research Laboratory comes the first details on a new method of high-energy forming 95

Eight builders run shop demonstrations . . . A round-up of new machines introduced in the Chicago area during the Machine Tool Exposition .. 97

Innovations at machine tool show in Paris 100

Do we need better welding standards? . . . Constructive suggestions abound at fall meeting of American Welding Society 101

Outpost in Berlin . . . U S toolmaking subsidiary thrives in an "island in a Red Sea" 102

Tooling makes calibrator automatic . . . 120-station machine checks and calibrates circuit breakers 104

Specialized heat treating reduces tool costs . . . Controlled atmosphere furnace gives more latitude in choosing steels. *By Donald F Griffin, Landis Machine Co* 106

Metal Show in Print . . . Details on new equipment, technical programs and the "new look" of this year's show in Philadelphia 125

SPECIAL REPORT NO. 497

Report from Detroit: Auto lines retool for the compacts 109

Aluminum engines for the Buick "Special" 110

Aluminum heads for the Oldsmobile "F-85" 113

V-8 line produces 4-cylinder "Tempest" engines 116

Chrysler automation makes starter frames 120

AMC die-casts aluminum blocks 123

REFERENCE BOOK SHEETS

Frustrums of cones, I, II . . . Formulas for developing cans with specified volume and desired shape. *By Ronald L Wakelee* 135

Weight of steel tubing or cylinders . . . A nomogram. *By F Caplan, Kaiser Engineers* 139

Trends . . .

Metalworking Report .. 2
Spot News .. 77
Washington .. 79
Detroit .. 81
Aircraft and Missiles .. 83
Machine Tools .. 85
Materials .. 87
What's Ahead .. 89

Departments . . .

Letters .. 70
Calendar .. 73
Editorial .. 93
Talking Shop .. 143
Practical Ideas .. 144
Names .. 148
New Materials .. 151
New Equipment .. 155
Field Report .. 187

TURN PAGE FOR METALWORKING REPORT→

METALWORKING REPORT . . .

. . . what's new and significant in manufacturing techniques and materials—direct from our own staff and round-the-world news bureaus

FORMING . . . Stretch forming may replace drawing for automotive body panels-at least for the gentler contours. Cyril Bath is announcing hydraulic binder attachments that fit standard drawing presses, and which permit two-way stretch forming over plastic dies. Auto industry is interested because sheet metal is stretched just beyond yield, and increases in hardness and strength throughout the panel. Common rolled steel can replace more costly drawing stock, and thinner gages can be applied. Tooling time should be less and would certainly be cheaper. For more details, see p 100.

WELDING . . . A new process will J-groove 4-in. steel plate in a single pass with an oxy-fuel-gas flame. Announced last week at the AWS Fall Meeting in Pittsburgh by C B Milton of Linde Co, the process involves slotted nozzles which are mounted on a standard machine carriage. It's said to produce J-grooves in both horizontal and vertical plate as well as along rounded edges such as those encountered in thick-walled pressure vessels or shipyard work. With double-pass techniques, it can J-groove 8-in. plate, putting the nose at either the middle or the side.

FORMING . . . AMC's die-cast aluminum engine block for the regular-size Rambler is a curious scoop in the automotive world. It is not the first aluminum block by any means, but it is the first aluminum die casting of its size and complexity. And although some other manufacturers are producing aluminum die-cast heads, AMC is sticking to CI until its complex head can be die cast in aluminum at some later date. The block is cast around six CI cylinder liners and two camshaft-bore liners. For production details, see p 123.

FINISHING . . . Nickel-aluminum coatings for oxidation protection at temperatures up to 1800 F can be electroplated onto steel, nickel, molybdenum, and other metals in a salt bath. National Bureau of Standards has been working out a method that involves a Watts bath held at 1300 F, in which aluminum diffuses into nickel underneath to form an alloy. The coating lasted a year in tests, against only four months for plain nickel. An aluminum deposit 0.000,25 in. thick can be produced in five minutes.

FORMING . . . "Autobend" control for any friction-clutch press brake is claimed to increase production as much as 50% by substituting for an operator's skill at the pedal. The General Automation Corp device allows speed pre-selection and choice of machine mode for custom or production operations. Cost of $2000 to $3000 includes control panels, ram-positioning switch, actuator, speed sensor, and electric pedal. Higher productivity is the result of the unit's ability to run the machine at optimum speed without whipping the work.

CUTTING . . . Water-based soluble coolant with measurable viscosity is said to cool like water, flow like oil. Developed by Anderson Oil and Chemical Co, working with a bearing manufacturer, Viscool made its first public appearance on several machines at Exposition last month. Lees-Bradner used it on vertical hobber, Landis Tool on a valve-stem grinder, Brown & Sharpe on the Model A drilling and tapping machine. Viscool will probably be ready for market early next year.

FORMING . . . An electromagnetic swager and an electromagnetic blowout switch are being used to compress brass ferrules used to join coaxial cables. The magnetic field compresses the metal to a "remarkably uniform connection that offers safety advantagesin high-energy transmission. About 6000 such connections will be made in a condenser bank by the Naval Reseach Laboratory to produce neutrons from fusion of hydrogen atoms. For more details, see page 95.

CUTTING . . . Three tape-controlled heads surround a central positioning table at a Hughes Aircraft MT-3 "Machining Center," just announced. The drilling, tapping, and boring head has a tool changer with 30 tools that can be exchanged in 3 seconds. A face-milling head and an optional multiple-spindle drilling head—or a boring head with 14-tool change—complete the setup. It works on any part containable within a 12-in. cube, cuts to ±0.0005 in., and can be programmed from a drawing to tape without a computer. Main application is for lots from 5 to 500 pc. Machine is built by Burkhardt & Weber, West Germany; assembled here.

ASSEMBLY . . . Breadboard layouts for pipe and tube, as well as rod stock, are easy to build up with a series of standardized fittings called Rotocon Assemblers, made by Unistrut Products Co, Chicago. There are snap clamps, mounting angles, and connectors for ¼- and ⅜-in. tube and rod, all designed for laboratory, pilot-plant, and even fixture applications. The connectors are toothed at 10° increments so they can be locked rigidly at any angle. Some units are insulated to carry wiring for electrical work.

HEAT TREATING . . . Improved convection flow of salt in Upton's Cross-Channel salt bath furnace provides greater heating capacity and allows higher KW input than heretofore possible in salt bath furnaces. Heating is done by passing electric current through pairs of oppositely sloping passages, or tunnels, in the walls which separate the main portion of the bath from the adjacent small wells containing the suspended electrodes. For full details, see page 126.

INSPECTION . . . Low-cost optical comparator produced by Micro-Vu, North Hollywood, Calif, has an 8-in. screen, a molded glass-fiber case, and a ground-and-lapped CI table for staging. The unit weighs only 20 lb, magnifies 20X, and is priced at $350. This is less than many imported units also designed for portability and low cost.

Coming in AM/MM

Blank development for formed parts . . .

Next in the popular series on 14 Steps to design a die

METALWORKING REPORT . . .

MATERIALS . . . Built almost entirely of molded glass-fiber reinforced plastic, a new airplane is under development by Parsons Corp, Traverse City, Mich. Designed for 300-mph air speed, and a 35-mph landing speed, using a single 250-hp engine, the plane will carry four people, including the pilot. Intended for military liaison-ambulance-observation service, this plane's construction may prove popular for civilian use.

MATERIALS HANDLING . . . Mechanized handling hits a new high at Chrysler's Indianapolis plant, where starter-motor frames for the '61 Chrysler and Imperial cars are made. Mechanical units tie together shearing, roll-forming, welding, and sizing operations. All work is handled through all operations by conveyors, cranes, elevators, and pneumatic positioners. For full details, see p 120.

MANUFACTURING CONTROL . . . One step to punched cards is the feature of a photoelectric Remington-Rand card puncher that works directly from pencil marks on the same card. Typical application: Machine operators mark tabulating cards, the scanner automatically punches the cards, then cards are run through data-processing equipment for production control. Punching speed on standard 90-column tabulating cards is 150 cards per minute. This bypasses slow manual punching entirely.

HEAT TREATING . . . If you have to heat treat very large parts, take a look at Battelle Memorial Institute's DMIC Memorandum 63. It lists the company, location, type, heating method, chamber size, protective atmospheres, maximum temperature, quenching media, and tempering facilities of all oversize heat-treating equipment in the country. The report is also available from the Office of Technical Services, Dept of Commerce, Washington 25, D C—PB 161213. A result of the increase in size of aircraft and other parts that must be specially handled, the report is a guide to furnaces that may be made available for special jobs, particularly one-of-a-kind.

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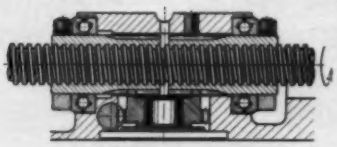
CINCINNATI

Impressions at the Exposition . . .

MMT-PE

Many fine Feature-Advantages *are common to all* CINCINNATI KNEE TYPE MILLING MACHINES



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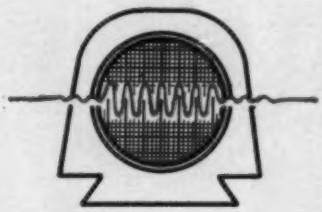

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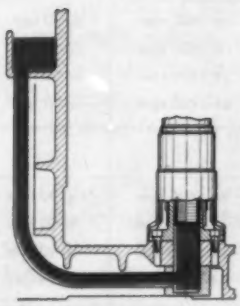


C

Knee type milling machines were much in evidence at the Exposition. Perhaps you did not have time, however, to see and compare all of them. This brief review will help you recall the Cincinnati exhibit of four fine knee types: a 5 hp Universal MI; a 10 hp Vertical Dial Type; a 15 hp Plain Dial Type, and a 50 hp Vertical Dual Power Dial Type.

Although these machines are within different power and price brackets, they have several common feature-advantages which keep the cost of variety milling at a minimum. Six are illustrated here, and there are many more.

No other machine tool builder gives you such a wide selection of fine knee type milling machines having so many profit-making features common to all. Write for more information. But first, look at the next two pages to see the low-cost performance of the BIG DIAL TYPES. **Milling Machine Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.**

D

E

F

ILLUSTRATIONS

A—Automatic backlash eliminator makes "down" milling and reciprocal milling a routine job.

B—Dynapoise overarm damps self-excited chatter.

C—Automatic, individual lubrication of vertical feed screw.

D—Arbor-Loc spindle nose, a quick change feature-advantage which takes standard arbors and collets.

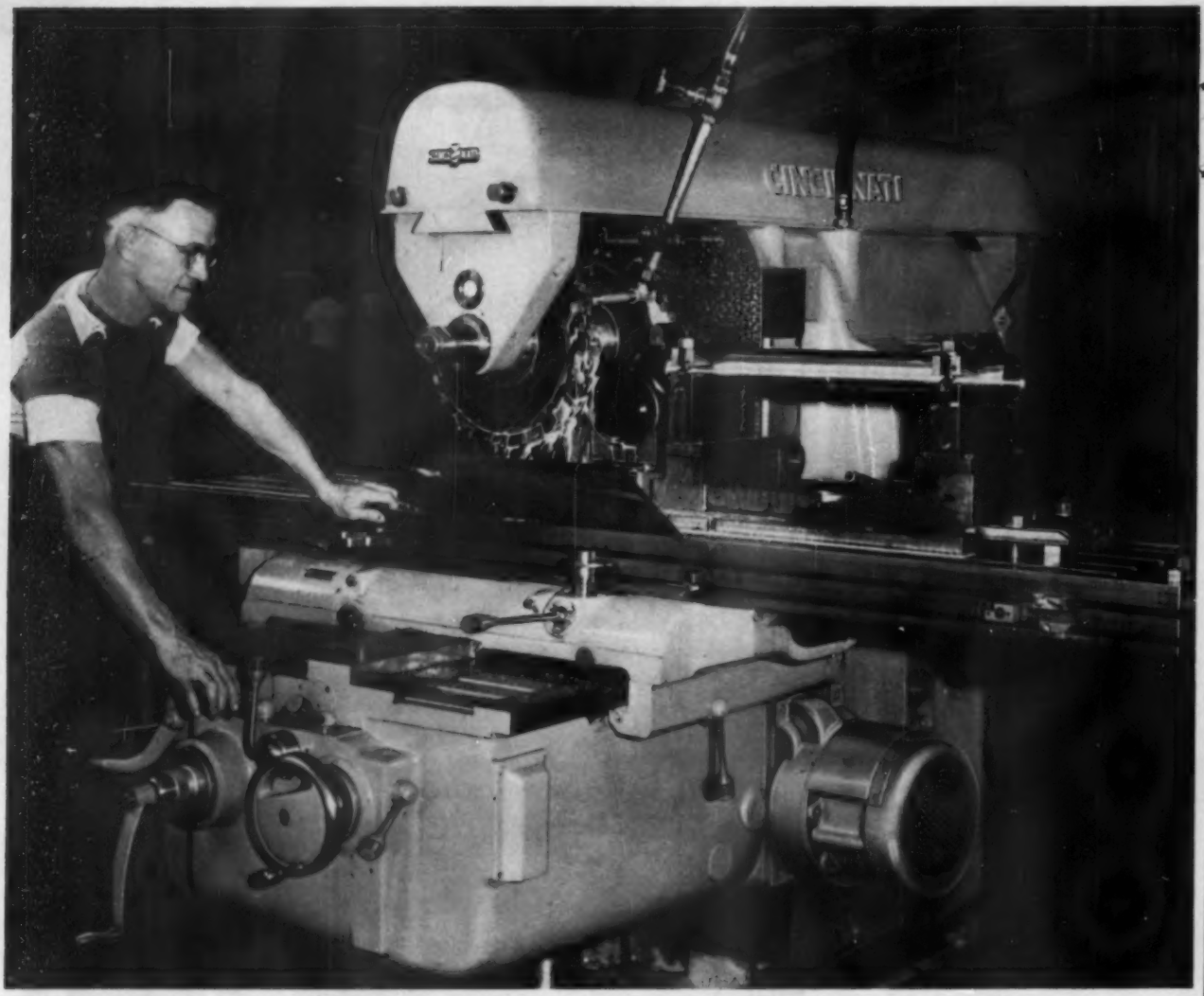
E—Large speed and feed dials, clearly visible, direct reading type. Speed dial for High Power machines illustrated.

F—Cradle type motor mounting, to facilitate servicing of motor and belts.

CINCINNATI®

MILLING MACHINE DIVISION

BUILDERS OF FINE MACHINE TOOLS: KNEE TYPE AND BE[illegible] GRINDERS • ELECTRICAL MACHINING EQUIPMENT



Extra large working range of the BIG DIAL TYPES is evident from the gang of cutters required for this straddle milling operation.

Power feed and speed changes in increasing or decreasing order with one lever. An exclusive Cincinnati advantage.

CINCINNATI HIGH POWER AND DUAL POWER DIAL TYPE MILLING MACHINES

HIGH POWER DIAL TYPE		SPINDLE DRIVE MOTOR, HP	SPINDLE SPEEDS	FEEDS
215-16, 315-16	plain, universal, vertical	15	16-1600 rpm	⅜-90 ipm
320-18, 420-18	plain, universal, vertical	20	16-1600 rpm	⅜-90 ipm
425-20, 525-20	plain, universal, vertical	25	14-1400 rpm	⅜-90 ipm
625-20	plain and vertical	25	14-1400 rpm	⅜-90 ipm
DUAL POWER DIAL TYPE				
220-16, 320-16	plain, universal, vertical	20	16-1600 rpm	⅜-90 ipm
330-18, 430-18	plain, universal, vertical	30	16-1600 rpm	⅜-90 ipm
450-20, 550-20	plain, universal, vertical	50	14-1400 rpm	⅜-90 ipm
650-20	plain and vertical	50	14-1400 rpm	⅜-90 ipm

Catalog No. M-2134

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BUILDERS OF FINE MACHINE TOOLS: KNEE TYPE AND BED TYPE MILLING MACHINES • DIE SINKING MACHINES •

THE CINCINNATI MILLING MACHINE CO., CINCINNATI 9, OHIO

CIRCLE 155 READER SERVICE CARD

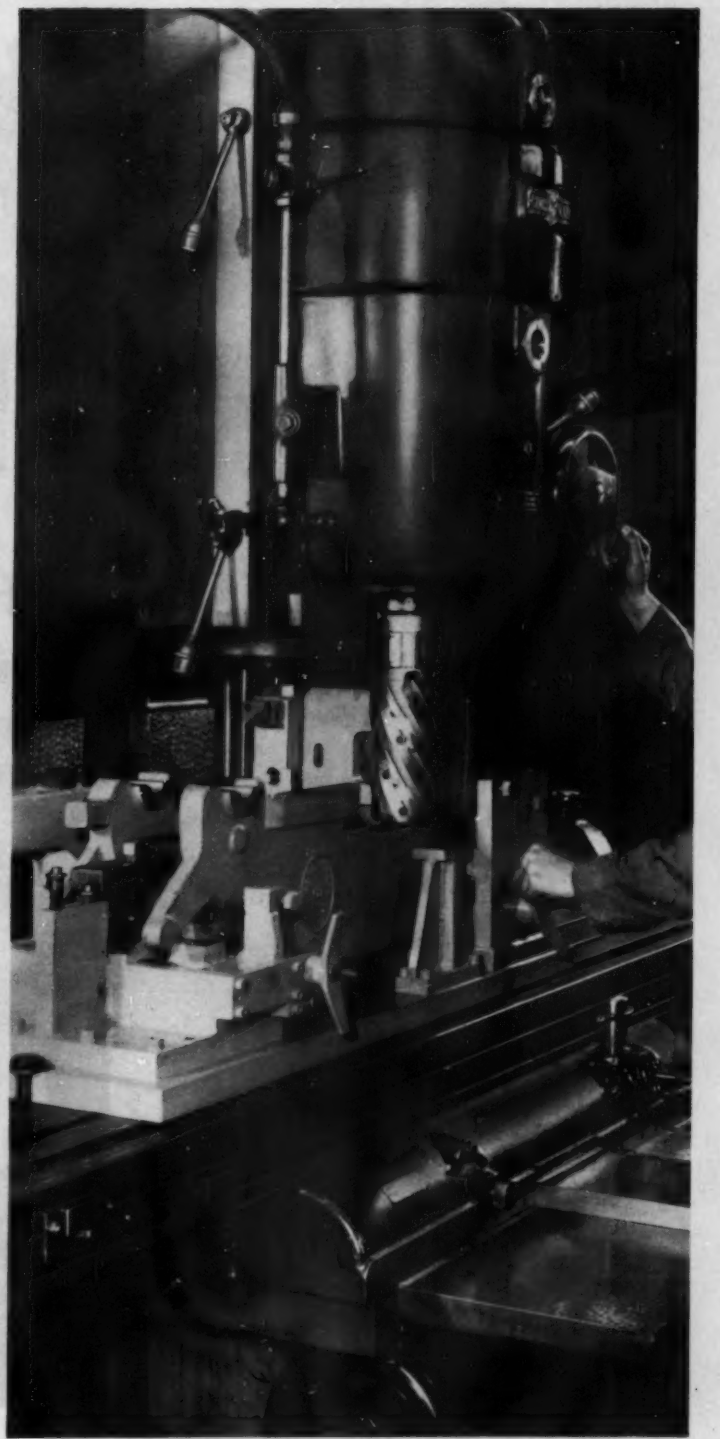
THE BIG DIAL TYPES

QUICKLY CUT METAL AND COSTS

At the recent Machine Tool Exposition it was a revelation to see the demonstration of Cincinnati Milling's big Dual Power Dial Type . . . how easily it could be handled . . . how quickly it could cut metal and costs. The following facts tell some of the reasons why:

- Extra large working surface and range—50″ and 60″ traverse for the 5 and 6 series respectively; smaller series in proportion
- Powerful drive—50 hp motor for larger sizes
- Single lever control of table feed and rapid traverse (plain and vertical machines)
- Four-position turret stop and vertical feed to head of vertical machines
- Hydraulic spindle starting, front and rear working positions
- Flywheel mounted on spindle—a feature-advantage for high speed carbide milling

These and other advantages give the CINCINNATI High Power and Dual Power line the highest value for replacing old knee type milling machines now inadequate for heavy duty toolroom and production milling. Brief specs are tabulated at left, and complete details are contained in catalog No. M-2134. Write today for your copy, or telephone Cincinnati REdwood 1-2121.



Setting up the big jobs is a lot easier and quicker for operators of High Power and Dual Power Dial Type Milling Machines. That's because of power speed and feed selection with one lever, automatic knockout of hand cranks, and many other feature-advantages. *Photo courtesy of E. W. Bliss Company*

CUTTER AND TOOL GRINDERS • ELECTRICAL MACHINING EQUIPMENT

CINCINNATI®
MILLING MACHINE DIVISION

CIRCLE 156 READER SERVICE CARD

now you can check & record fine-pitch gear accuracy

at 1600 magnifications

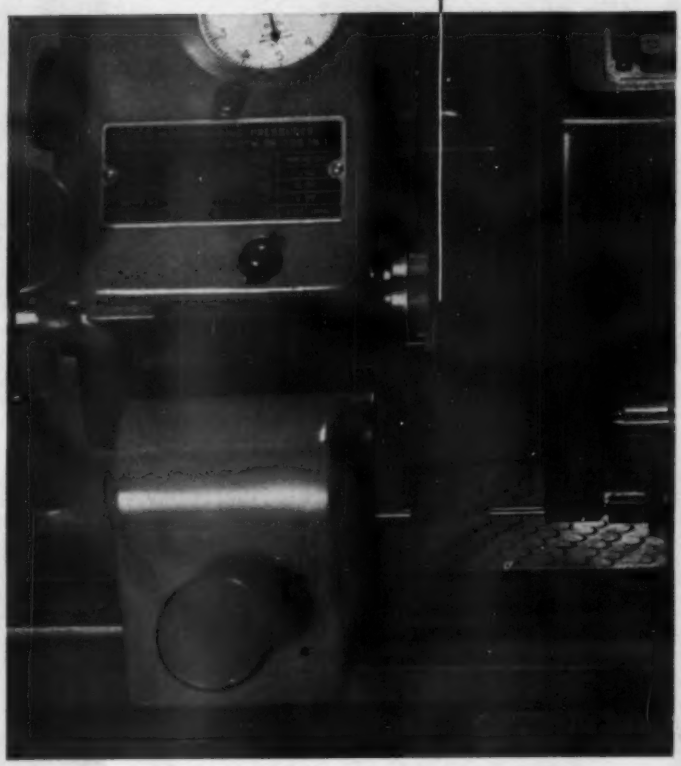
on the No. 4 Fellows Red Liner

Now, the No. 4 Red Liner makes "composite" checks on the finest instrument gears with unbelievable accuracy and sensitivity. 1600 to 1 magnifications are obtained with the electrical recording system which gives a written, unbiased record for instant reading or for proof-of-accuracy files.

One report states — "11 teeth, 200 D. P. pinion backed up to a 100 tooth gear on a cluster, checked easily on the No. 4 Red Liner."

The job shown is 96 pitch with 22 teeth on the small gear and 80 teeth on the larger gear. The pinion shaft rides in vees in a turret-type fixture.

Fellows inspection units cover a range from the tiniest instrument gear up to some that are 24 inches in diameter.



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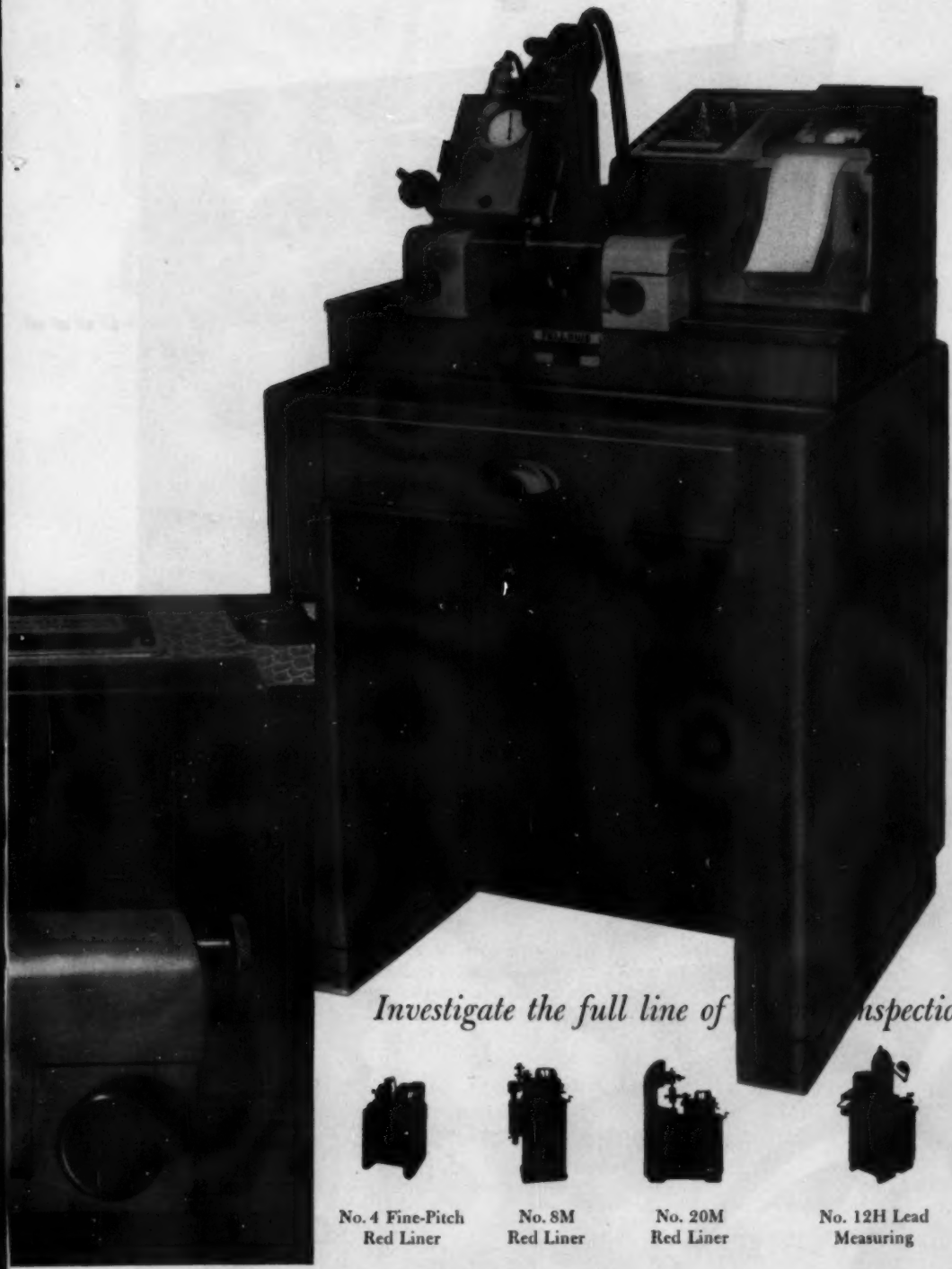


Investigate the full line of [illegible] *inspection equipment*

No. 4 Fine-Pitch Red Liner

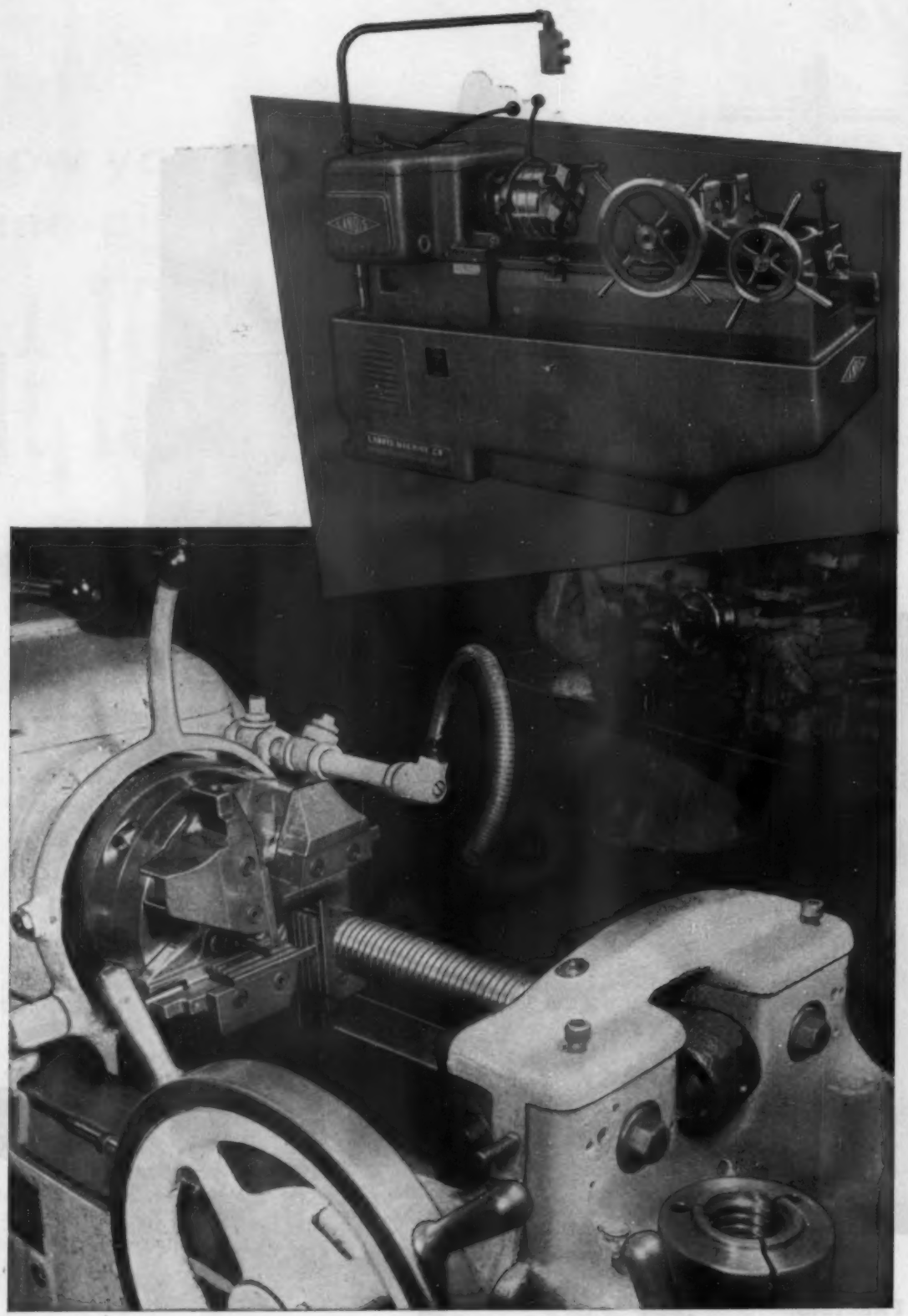
No. 8M Red Liner

No. 20M Red Liner

No. 12H Lead Measuring

No. 12M Involute Measuring

THE PRECISION LINE **Fellows** *Gear Production Equipment*



461-C -2

coarse threads

cut in one pass with LANDMACO machines

The cutting of large diameter Acme threads at the Iowa Manufacturing Co. of Cedar Rapids, Iowa, illustrates the heavy duty threading possible on LANDMACO Threading Machines.

1045 steel forgings of 20-29 Rockwell C are used in the production of adjusting screws for construction equipment. 2¼"-3 pitch Special Acme threads (EXTRA DEEP) are cut 10" long, with a .026 pitch diameter tolerance and a .001 per inch allowable lead error.

Cutting at a speed of 7.6 surface feet per minute, 12.5 pieces are completed per hour. This includes 100% gaging on the machine, using go-and-no-go gages. Despite the large amount of metal removal, at least 80 pieces are produced between chaser grinds.

This job is an excellent example how such heavy-duty threading can be done with the LANDMACO Machine. The 2½" Single Spindle Machine (½" to 2½" range) used here features heavy construction, hardened-and-ground ways, lead screw attachment, and is equipped with a rugged LANCO Tangential Chaser Die Head. Roughing-and-Finishing Centering Throat Chasers produce heavy cuts in one pass of excellent finish, eliminate the out-of-roundness common in long heavy workpieces, and provide low tool cost.

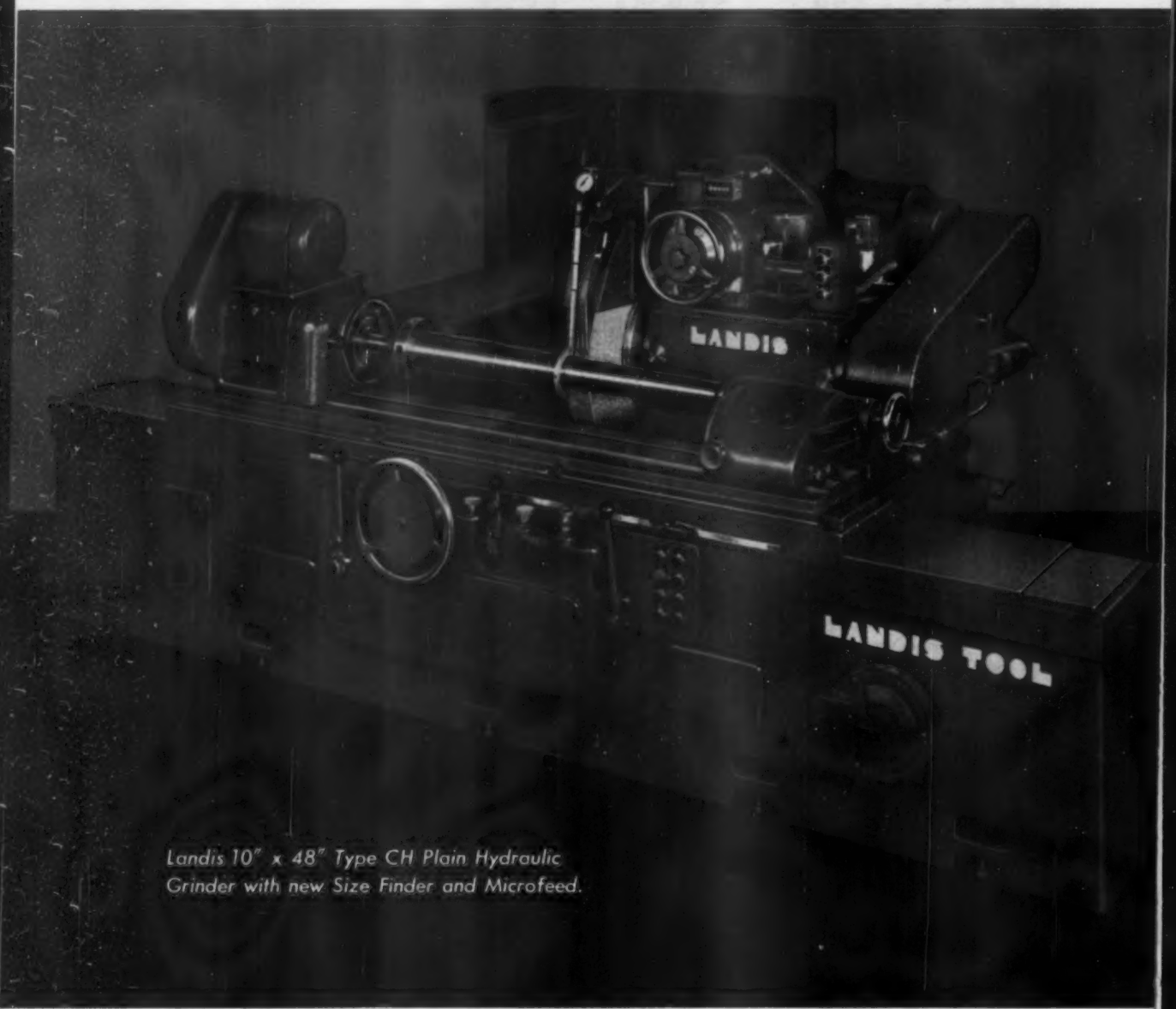
LANDMACO Machines offer precision and heavy duty threading within a range of #4 to 4" in diameter. For more detailed information, please send specifications when writing.

THE WORLD'S LARGEST MANUFACTURER OF THREADING EQUIPMENT - CUTTING - TAPPING - GRINDING - ROLLING

LANDIS Machine COMPANY WAYNESBORO PENNSYLVANIA

Landis grinder with new Size Finder

new Landis development with Microfeed lowers grinding costs on lathe headstock spindle... saves setup time... assures close tolerances



Landis 10" x 48" Type CH Plain Hydraulic Grinder with new Size Finder and Microfeed.

LANDIS TOOL COMPANY

saves 82 minutes grinding 9 diameters

production data

Part:.....Lathe headstock spindle

Machine:.....Landis 10" x 48" Plain Grinder with Size Finder and Microfeed

Operation:.....Grinding 9 different diameters. One diameter is tapered

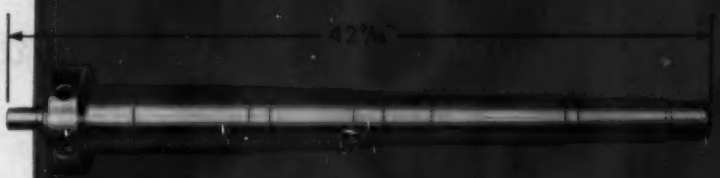
Production:.....With new Landis Size Finder—1 part every 42 minutes

Former method—1 part completed in 124 minutes

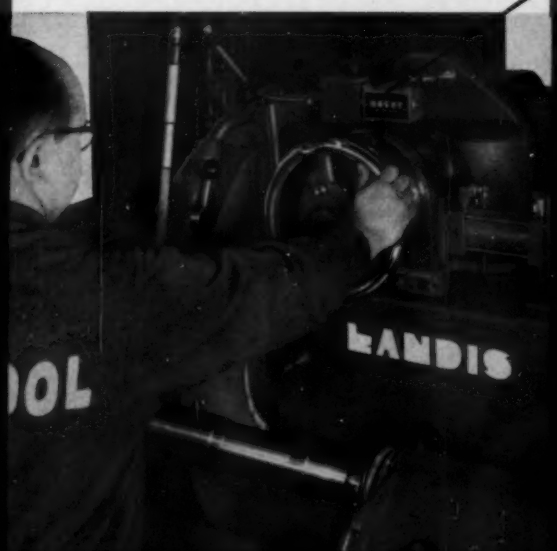
Stock removal:...020"-.030"

Part tolerances: Size—.0005" max. Roundness—.00005" max. Straightness—.0001"

Finish:.....25 RMS



size finder



How size finder speeds multiple diameter shaft grinding

The new Landis Size Finder is a direct reading indicator on the wheel feed handwheel. It permits the operator to set the finish dimension on the indicator by turning the wheel feed handwheel. This establishes the face of the wheel to the correct position to grind the desired dimension. Operator starts the cycle, applies the sizing gage and stops the cycle when the gage shows finish size. He moves the work table, resets the Size Finder for the next diameter and repeats the cycle.

Size Finder with Microfeed shows remarkable savings in setup and grinding time. Send us prints of your shaft for our proposal.

WAYNESBORO, PENNSYLVANIA

LANDIS

precision grinders

Announcing a major advance

Mobilmet Oils

the first multi-metal cutting fluids...
with unique pressure-temperature selective activity.

This Tapping Efficiency Tester is one of many Mobil research tools used in the development of cutting fluids such as Mobilmet . . . effectively evaluates the machining efficiency of cutting oils on soft, draggy SAE 1020 steel. On this difficult machining operation as well as in field service, Mobilmet oils have demonstrated results better than conventional cutting fluids intended for this application. Other applications for new Mobilmet oils include: Turning, Drilling, Boring, Milling, Gear Hobbing, Shaping and Shaving, Threading, Tapping, Pipe Threading, Surface and Internal Broaching, Thread and Form Grinding, Thread Rolling, Forming and Special Automatic Screw Machine Operations.

CIRCLE 163 READER SERVICE CARD

in cutting-oil technology...

Now... from Mobil Research... versatile new cutting fluids that offer you: • greater machine output • lower tool costs • reduced loss from rejects... over wide ranges of metals and operations!

Now, after two years of exhaustive research and field testing . . . new Mobilmet* oils—the first multi-metal cutting fluids ever offered to the metalworking industry.

Mobilmet oils are uniquely versatile . . . help simplify your cutting oil requirements because each grade is effective over ranges of metals and operations beyond the capacity of any conventional product. And Mobilmet oils offer you superior machining results as well—in terms of improved finishes, longer tool life, and reduced staining.

Behind this versatility and effectiveness: a new additive composition, developed and patented by Mobil, which is *pressure-temperature selective* in its activity—highly effective over the wide ranges of cutting pressures and temperatures produced in machining various metals with greatly different physical characteristics. As a result, Mobilmet oils are useful for both tough, draggy metals and hard, brittle metals.

Call your Mobil Representative, or use the coupon below.

Mobil

*Mobilmet is a trademark of Socony Mobil Oil Company, Inc.

MOBIL OIL COMPANY, 150 East 42nd Street, New York 17, N. Y.

Mobilmet oils offer superior tool life on both soft, draggy metals and hard, clean-cutting materials. These pipe threading chasers used for six weeks in moderately severe job-shop service show little wear on either tool faces or thread crests. Results were achieved with heavy-duty Mobilmet oil.

Since they effectively control built-up edge and tool wear, Mobilmet oils provide superior finishes that meet exacting specifications—with fewer rejects, and in some cases reduced necessity for additional finishing operations.

Stain-inhibiting effect of new additive combination is demonstrated with two steel plates. Plate on the left was immersed in conventional corrosive cutting oil; plate on the right was immersed in heavy-duty Mobilmet grade intended for the same application. Re-polished tops of plates show original condition.

Mobil Oil Company, Room 2057-A
A Division of Socony Mobil Oil Company, Inc.
150 East 42nd Street, New York 17, N. Y.

Gentlemen: I am interested in learning how Mobilmet oils can improve metal-cutting operations at my plant. Contact me about setting up an evaluation program.

*Name*_____

*Position*_____

*Company*_____

*Address*_____

*City*_____ *State*_____

CIRCLE 164 READER SERVICE CARD

NEW TOOL STEEL SERVICE

cuts inventory costs

Using too many grades of tool steel can lead to over-stocking—

that's when you need the benefits of Crucible's new Tool Steel Service!

A Crucible Service Engineer can prove that buying a few basic grades—

in quantity—enables you to carry fewer pounds in stock...

gives you a lower price per pound (you eliminate small quantity "extras"),

and with fewer grades to identify, you reduce the possibility of "mixed" steel.

All through standardizing on a few basic steels!

For the full story on this cost-reducing service, call in a Crucible Service Engineer

CRUCIBLE STEEL COMPANY OF AMERICA

Branch Offices and Warehouses: Atlanta • Baltimore • Boston • Buffalo • Caldwell, N. J. • Charlotte • Chicago • Cincinnati • Cleveland • Columbus • Dallas • Dayton Denver • Detroit • Erie, Pa. • Grand Rapids • Houston • Indianapolis • Los Angeles • Miami • Milwaukee • Minneapolis • New Haven • New York • Philadelphia Pittsburgh • Portland, Ore. • Providence • Rockford • Salt Lake City • San Francisco • Seattle • Springfield, Mass. • St. Louis • E. Syracuse • Tampa • Toledo • Tulsa

CRUCIBLE STEEL OF CANADA, LTD., SOREL, QUEBEC, CANADA

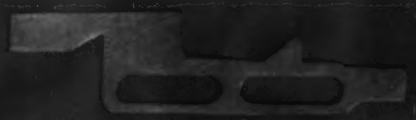
Grinds to today's

PRECISION TOLERANCES

with Gardner double spindle grinders

steel guide tab
stock removal: .003"—.007"
flatness: .0005"
parallelism: .0005"
uniformity: .001"

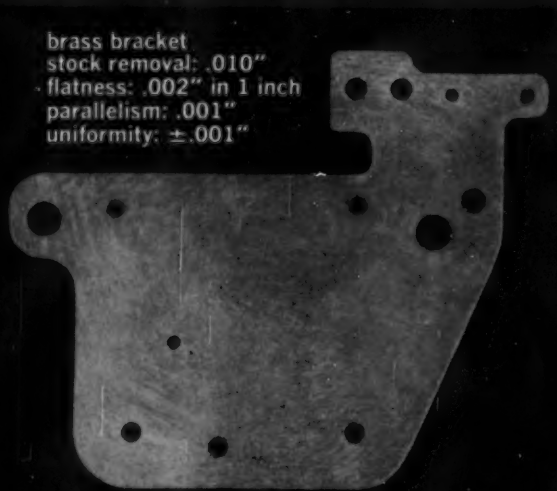
steel friction gear
stock removal: .008"
flatness: .001"
parallelism: .001"
uniformity: ±.002"



steel lever margin control
stock removal: .003"—.010" max.
flatness: .0003"
parallelism: .0003"
uniformity: .001"

steel magnet yoke
stock removal: .008"
flatness: .001"
parallelism: .001"
uniformity: ±.0009"

Gardner 2H30 precision double spindle grinder—one of many Gardner machines capable of producing precision parts at high, cost-saving output . . . Send prints of your parts for a Gardner proposal.



brass bracket
stock removal: .010"
flatness: .002" in 1 inch
parallelism: .001"
uniformity: ±.001"

GARDNER

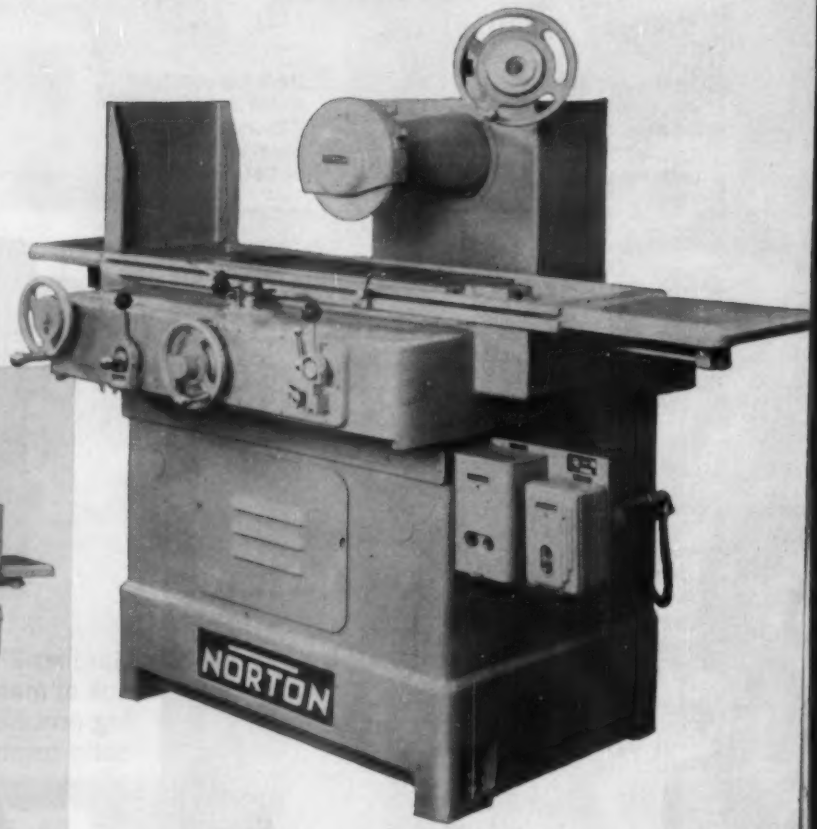
precision disc grinders

BELOIT, WISCONSIN

Now... Type S-3 surface with 150 *fpm* table

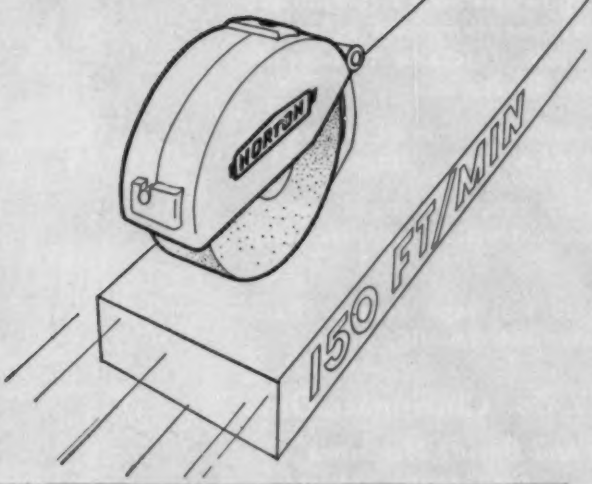
for faster production than ever before!

Available in 6" x 18" and 8" x 24" sizes. Both sizes are equally fast, cool, accurate on long production runs or a wide variety of toolroom grinding. Taller workpieces are easily handled by the 15" vertical capacity of the 6" S-3, and 13¾" capacity of the 8" S-3 Grinder. Other job-proved features include a two-speed .0001" increment hand wheel, assuring accurate vertical speed and fast positioning . . . contoured splash guards, for better sighting and loading.



NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Electro-Chemicals — BEHR-MANNING DIVISION: Coated Abrasives • Sharpening Stones • Pressure Sensitive Tapes

grinders speed...



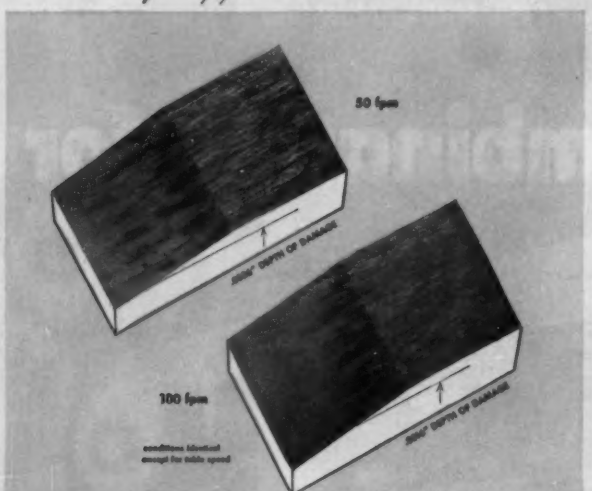
Long popular for their pace-setting table speeds up to 125 feet per minute, Norton Type S-3 surface grinders have given complete proof of their ability to finish workpieces smoother, faster, at lower cost.

Now S-3 grinders are also available with table speed stepped up to a new high of 150 feet per minute — enabling you to finish flat faster than ever, with cool-running action that saves time and money on every job.

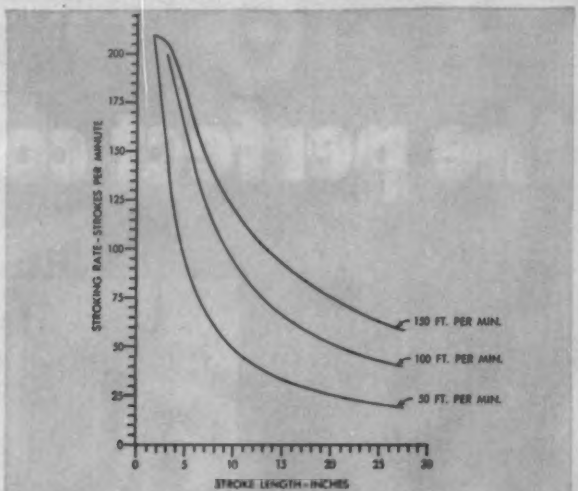
Get the whole story from your Norton Man, a trained specialist who can help you get better grinds at lower cost. Or ask for Catalogs 1982 and 2128. NORTON COMPANY, Machine Tool Division, Worcester 6, Mass. District Offices: Worcester, Hartford, Cleveland, Chicago, Detroit. *In Canada:* J. H. Ryder Machinery Co. Ltd., Toronto 5.

NORTON
MACHINE TOOLS

75 years of... Making better products
...to make your products better



You Get Better Quality Work with Norton Type S-3 surface grinders, thanks to their faster table speeds, which reduce heat damage. The above test samples show how faster table speeds result in cooler grinding.



Calculate Your Savings from this production rate chart. Grinding time is reduced in proportion to the increase in stroking rate. The higher speeds also greatly increase the rate of stock removal.

MACHINE TOOL DIVISION: Grinding and Lapping Machines — E & E DIVISION: Shapers • Gear Cutting Machines • Gear Induction Hardeners

▲ CIRCLE 168 READER SERVICE CARD

CIRCLE 169 READER SERVICE CARD ►

GRAY was the first to recognize the unparalleled advantages of the Norden System of Numerical Control when applied to a Gray Horizontal Milling and Boring Machine or a Planer Type Milling Machine.

Gray was the first to introduce this superior control that was jointly developed by Gray and Norden.

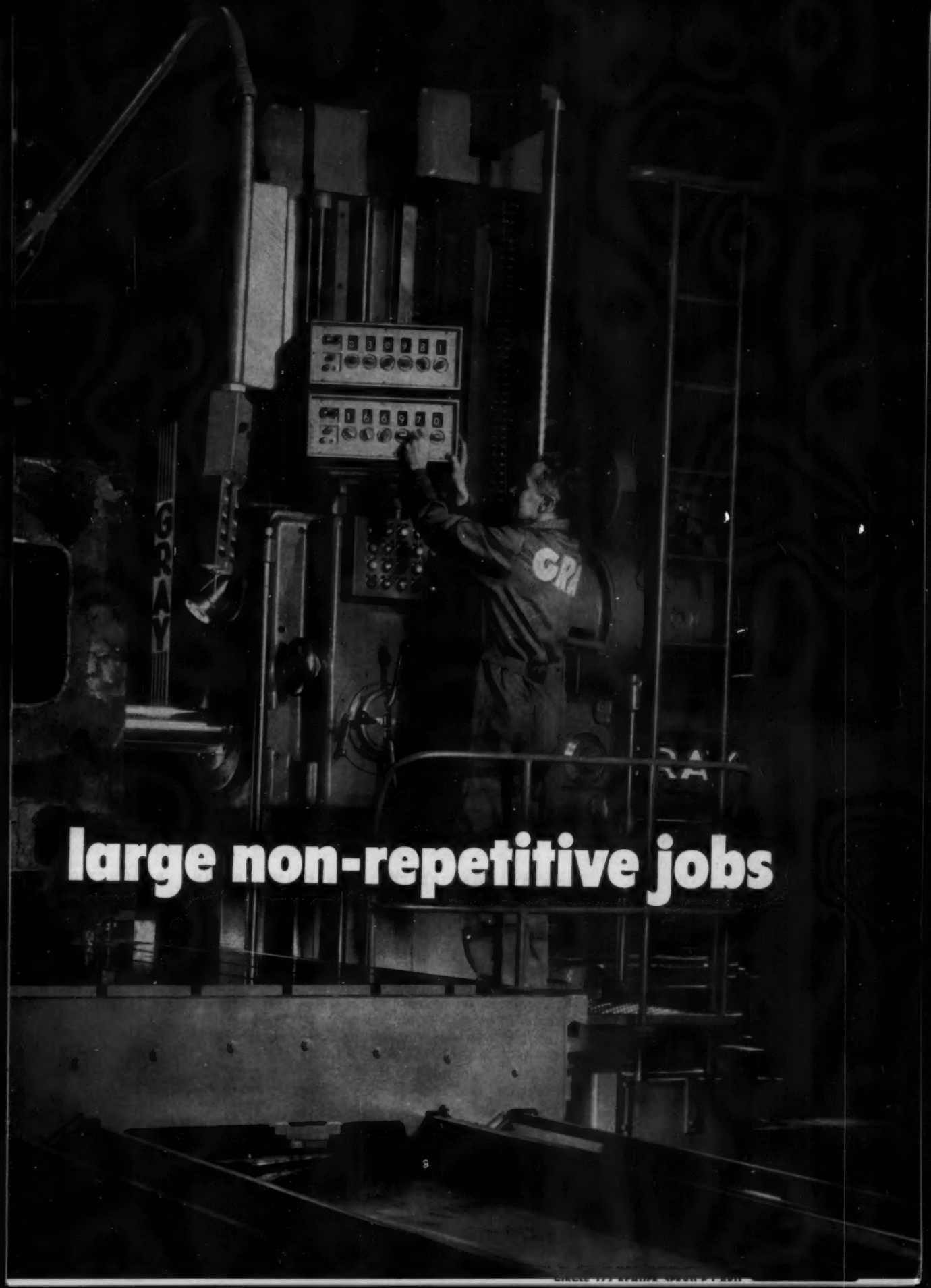
Consider these salient features:

- Read-out. A visual display clearly indicating at all times the exact location of a machine tool element.
- Zero Off-set. Ability to establish zero read-out on the display at any predetermined reference point on the work piece. Operator then reads drawing dimensions on display unit.
- Work to closer accuracies. Overall accuracies within .001". Unaffected by line voltage.
- Greatest productivity over prolonged period. Replaceable modular construction facilities quick servicing.
- Progressive steps to full tape control. Each phase may be purchased individually.

The G. A. GRAY Co. Cincinnati, Ohio

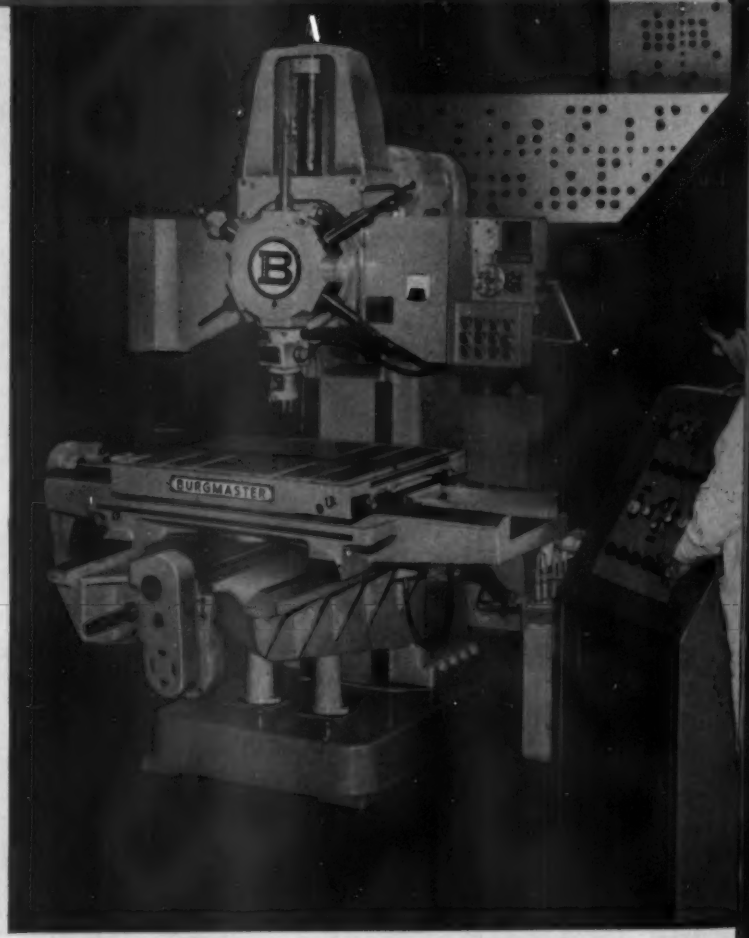
Horizontal Milling and Boring Machines
Planers • Planer Type Milling Machines

the perfect combination for


large non-repetitive jobs

New! BURGMASTER

The new Burgmaster Model 25AHT is a heavy duty tape controlled machine that introduces improved controls and many mechanical refinements. An optional 4-speed motor doubles the spindle speed range; numerical controls of the most advanced design automatically machine complex hole patterns with precision, eliminating complicated fixtures, jigs or drill bushings.



CHECK THESE IMPORTANT MACHINE FEATURES

1. Preselective individual spindle speeds.
2. Speed range: 90-3000 RPM (24 speeds)
3. Preselective infinitely variable hydraulic feeds. — Range 1/4"-50"/Min. Rapid Traverse up and down at 240"/Min.
4. Hydraulic feeds are automatically temperature and pressure compensated.
5. Positive hydraulic feed rates are dial calibrated.
6. Table automatically positions on 2 axis: turret simultaneously indexes through predetermined sequence.
7. Selective rapid approach and return and preset Depth Stops—quick-setting type. ("Z" axis control optional, at extra cost.
8. Heavy-duty construction — weighs up to 10,000 lbs.
9. Quick set-up from one job to another: 25 to 30 minutes.
10. Index accuracy — Spindle to Spindle .0004".
11. Very rigid spindle and turret suspension with turret clamp for programmed milling.

BURGMASTER Model 25AH Automatic Hydraulic 6-Spindle Turret Drilling, Tapping and Boring Machine is also available in this new series and has the same basic machine features and improvements as the model 25AHT Tape Controlled Machine.

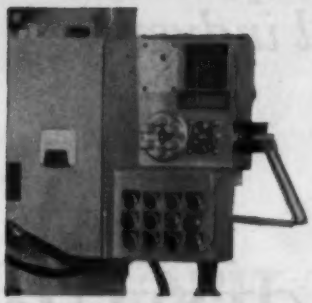
HOW BURGMASTER FEATURES SOLVE TOOLING, PRODUCTION AND INSPECTION PROBLEMS:

- Greatly reduced lead time to get into production—ideal for small lots.
- Simplified tooling—eliminates expensive fixtures—drill bushings not required.
- Easy to program: 1 minute per hole location; prepare tape: 4 holes per minute; set up machine: 3-5 minutes per tool.
- Lower labor costs—requires only semi-skilled labor.
- Less spoilage—does not depend upon operator's skill.
- Greater accuracy of hole location. Table positions automatically ±.001", repeatable to ±.0003".
- Increased tool life—feeds and speeds are preselected for greater efficiency.
- Reduces inspection—center dimensions automatically controlled.
- Easy to operate—one operator can run two or more machines, inspect, deburr, etc.
- Will replace 6 spindle, in-line drills, radial drills, jig borers for many applications, multiple drill and tap heads, expensive fixtures, layout drills, etc.
- Most important—will return its investment more quickly than almost any other standard type machine.

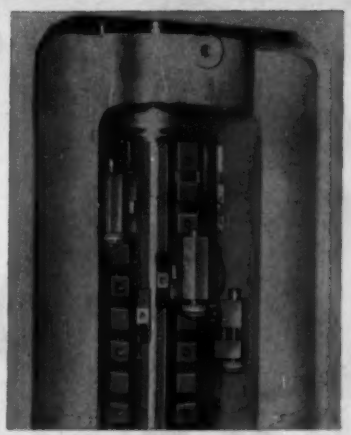
◀ CIRCLE 170 READER SERVICE CARD

6-SPINDLE TURRET DRILL

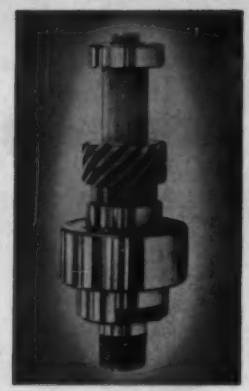
AUTOMATIC HYDRAULIC TAPE CONTROLLED 1 1/4" CAPACITY IN STEEL



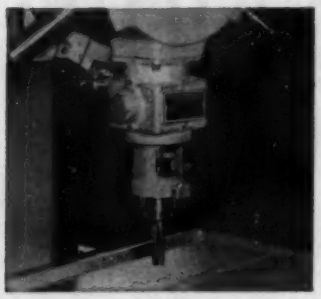
Quick Setting Controls are used to preselect infinitely variable feeds, pressure and temperature compensated, from ¼" to 50" per min., with direct reading dial. Preselect spindle speeds ranging from 90 to 3000 RPM.



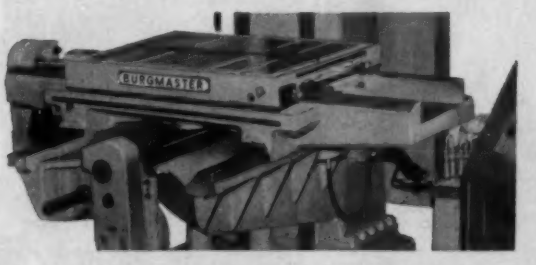
Quick-Set Depth Stops and quick set traverse controls are hand set for rapid set up. Final adjustment with a micrometer screw permits high accuracy.



One-Piece Forged Spindle and Gear provides increased spindle strength and minimum spindle run-out. Preloaded high precision double row ball bearing at rear give maximum rigidity.



Lead Screw Tapping Head greatly improves the finish and accuracy of tapped threads and eliminates scrap due to pulled or loose threads. Capacity 1"-8" in steel.



Positioning Table is mounted on a double dovetail column way and supported on double synchronized screw jacks that position table for height. Positioning accuracy in X and Y axes is ± .001" over the table travel, and repeatable to ± .0003".

The Turret is Rigidly Held against the face of the slide on a wear plate and securely clamped in a "V" type cam lock clamping ring to provide increased accuracy during heavy machining operations.

Write for new Bulletin describing Burgmaster Model 25AHT and 25AH 6-Spindle Turret Drilling, Tapping and Boring Machines. Forty-minute 16mm sound film showing all Burgmaster Turret Drills in operation is available without charge.

World's Largest Builder of Turret Drilling Machines

"0" Manual Power Index ¼" Capacity

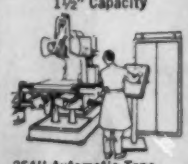
1C Manual Power Index ⅜" Capacity

2B Manual Power Index ¾" Capacity

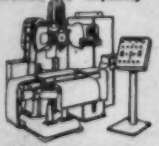
2BR Ram Type Radial Drill ¾" Capacity

2BH Automatic Hydraulic ¾" Capacity

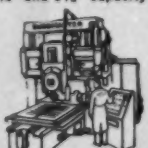
3BH Automatic Hydraulic 1½" Capacity



25AH Automatic Tape Controlled 1¼" Capacity



2BHT-3BHT Automatic Tape Controlled ¾" and 1½" Capacity



3 BHT-B Automatic Tape Controlled—1¾" CAP.

BURG TOOL

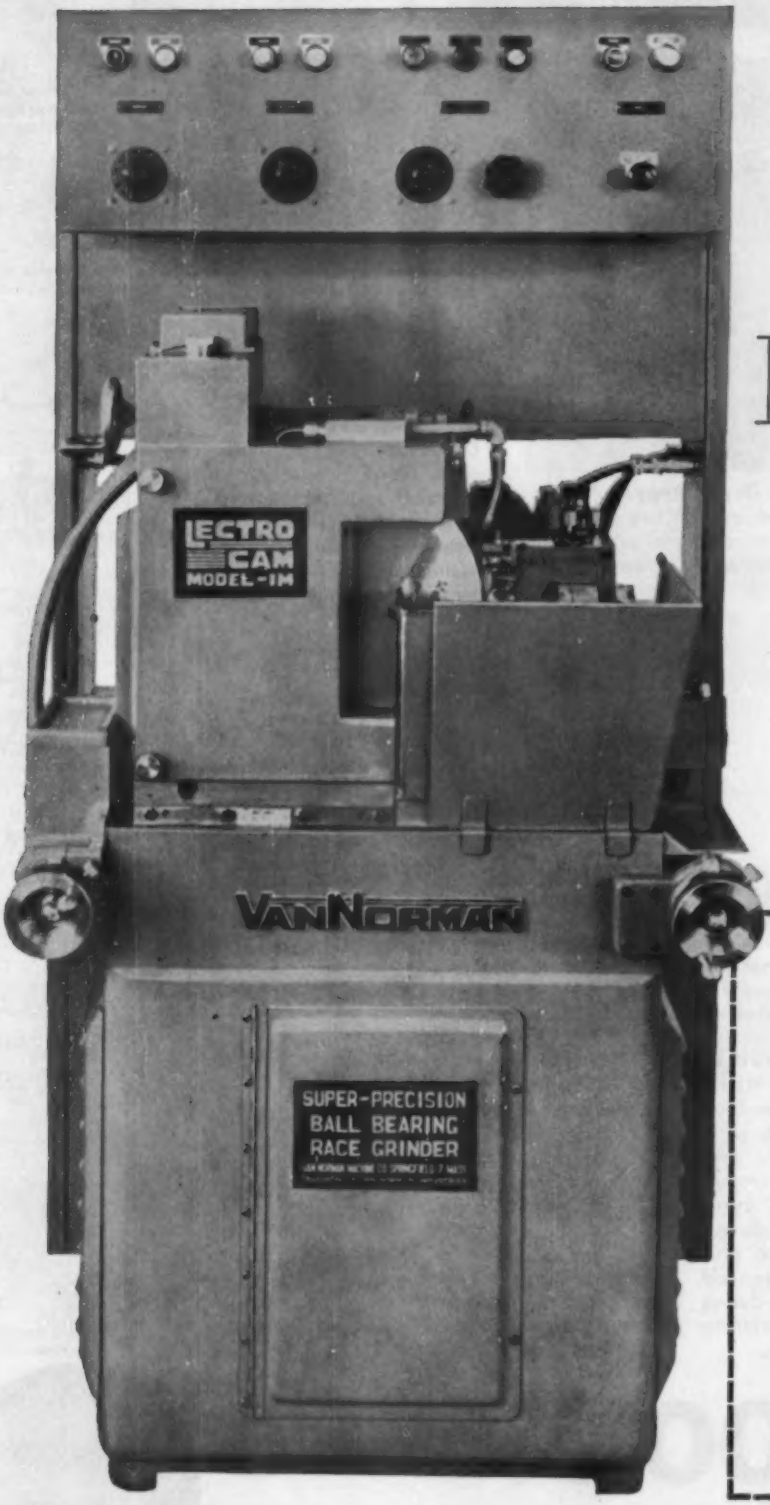
MANUFACTURING COMPANY, INC.
15001 South Figueroa St., Gardena, Calif.
FAculty 1-3510 • DAvis 9-4158

BURGMASTER DIRECT SALES OFFICES: Ridewood, N.J., 86 North Maple Ave., Gilbert 4-3002 • Chicago 5, Ill., 4908 Lincoln Ave., LOng Beach 1-1178 • Cleveland 7, Ohio, 14706 Detroit Ave., ACademy 6-7030 • Detroit 37, Mich., 13730 W. Eight Mile Rd., Lincoln 8-4333 • Northern California, Castro Valley, JEfferson 7-1650

CIRCLE 172 READER SERVICE CARD

It wowed 'em in Chicago— and it's an eye-opener for all industry!

NEW MACHINE VAN



One of the biggest draws at the MACHINE TOOL BUILDERS' EXPOSITION

All-New VAN NORMAN MINIATURE BEARING GRINDER

...plunge-cut radius grinder specifically designed to meet the requirements of the bearing industry for fast, easy, precision grinding of ball grooves on inner races of miniature bearings.

SPOTLIGHTS NORMAN POLICY OF "INDUSTRY-INTEGRATED DESIGN"

Production Benefits Most-Wanted by Each Industry Supplied by Machines Engineered to the Industry's Specific Requirements.

Van Norman "Industry-Integrated Design"— as typified by the new Model-1M Lectro-Cam Miniature Bearing Grinder—offers every industry the machines it needs for higher production, finer precision and greater savings. This broad Van Norman program is based on your own specific requirements, engineered with Van Norman know-how and skill into production tools that do the best job for *you*.

Widely versatile Van Norman engineers will work with you, and with your men at the management, engineering and production levels. You'll find that Van Norman Machine specialists speak your language. Their preferred approach to any particular machining problem is one of close cooperation with the responsible people at every stage of the design and development of a new machine tool. Your own ideas and suggestions are carefully studied, and ways are sought to incorporate them as solid benefits through sound Van Norman design principles accumulated during more than six decades.

Whatever your machine requirements, you will get all-round efficiency through Van Norman "Industry-Integrated Design." Let us know your needs. Contact Van Norman Factory or Van Norman Local Machine Tool Distributor.

2608

VAN NORMAN MACHINE COMPANY

VN

SPRINGFIELD 7, MASSACHUSETTS • A DIVISION OF VAN NORMAN INDUSTRIES, INCORPORATED

Alcoa Alloy 6262-T9*—another Alcoa first—promises to become a standard in the screw machine products industry

*Patent applied for

a comparison of the characteristics of ALCOA SCREW MACHINE STOCK ALLOY 6262-T9 with other ALUMINUM SCREW MACHINE STOCK ALLOYS

	6061-T6	2017-T4 and 2024-T4	2011-T3
Strength	better	better(1)	better
Machinability	better	better(2)	not as good
Corrosion Resistance	same	better	better
Finishing Characteristics	same	better	better

(1) Based on Yield Strength
(2) Depends on Method of Machining

RELATIVE CHIP SIZE RATING
2011-T3: 1.0 6262-T9: 1.4 2017-T4 and 2024-T4: 2.0—3.0 6061-T6: 4.0

Visit the Alcoa exhibit, Booth 1410, National Metals Exposition, Philadelphia, Pa., October 17-21, 1960.

ALCOA'S NEW ALLOY 6262-T9 IS EXPECTED TO REPLACE ALLOY 6061 ENTIRELY AND 2017, 2024 IN MANY APPLICATIONS.

DESIGN ADVANTAGES—Higher typical properties (58,000 psi tensile strength, 55,000 psi yield strength, 10 per cent elongation) than 2011, 2017, 2024 and 6061—better corrosion resistance and finishing characteristics than 2011, 2017 and 2024—not subject to stress corrosion cracking.

ECONOMIC ADVANTAGES—Buyers can reduce inventories—stock one or two alloys instead of four—streamline purchasing—order in larger quantities.

PRODUCTION ADVANTAGES—Better machinability than 2017, 2024 and 6061.

For complete information, specifications, delivery of the newest aluminum screw machine stock alloy—Alcoa 6262-T9—call your nearest Alcoa sales office, or distributor, or write: Aluminum Company of America, 843-K Alcoa Building, Pittsburgh 19, Pa.

HIGHER STRENGTH—6262 offers higher strength than alloys 2011, 2017 and 2024.

BETTER CORROSION RESISTANCE—6262 offers better corrosion resistance and finishing characteristics than alloys 2011, 2017 and 2024.

BETTER MACHINABILITY—6262 offers better machinability and higher strength than alloy 6061 . . . corrosion resistance and finishing characteristics comparable to 6061.

ALCOA ALUMINUM

SCREW MACHINE STOCK

CALCULATED TO CUT COSTS

Every CARD tap is duplicated with geometric precision, in each type and size. This exact duplication brings valuable production benefits to every user. Make sure you get them by specifying CARD taps from your CARD Distributor. He has the taps, dies, gages and screw plates you need. For expert aid in selection and use, see your CARD technical man. S. W. CARD DIVISION, Mansfield, Mass. Card Warehouses: Atlanta, Chicago, Detroit, Fort Worth, Los Angeles, New York, San Francisco.

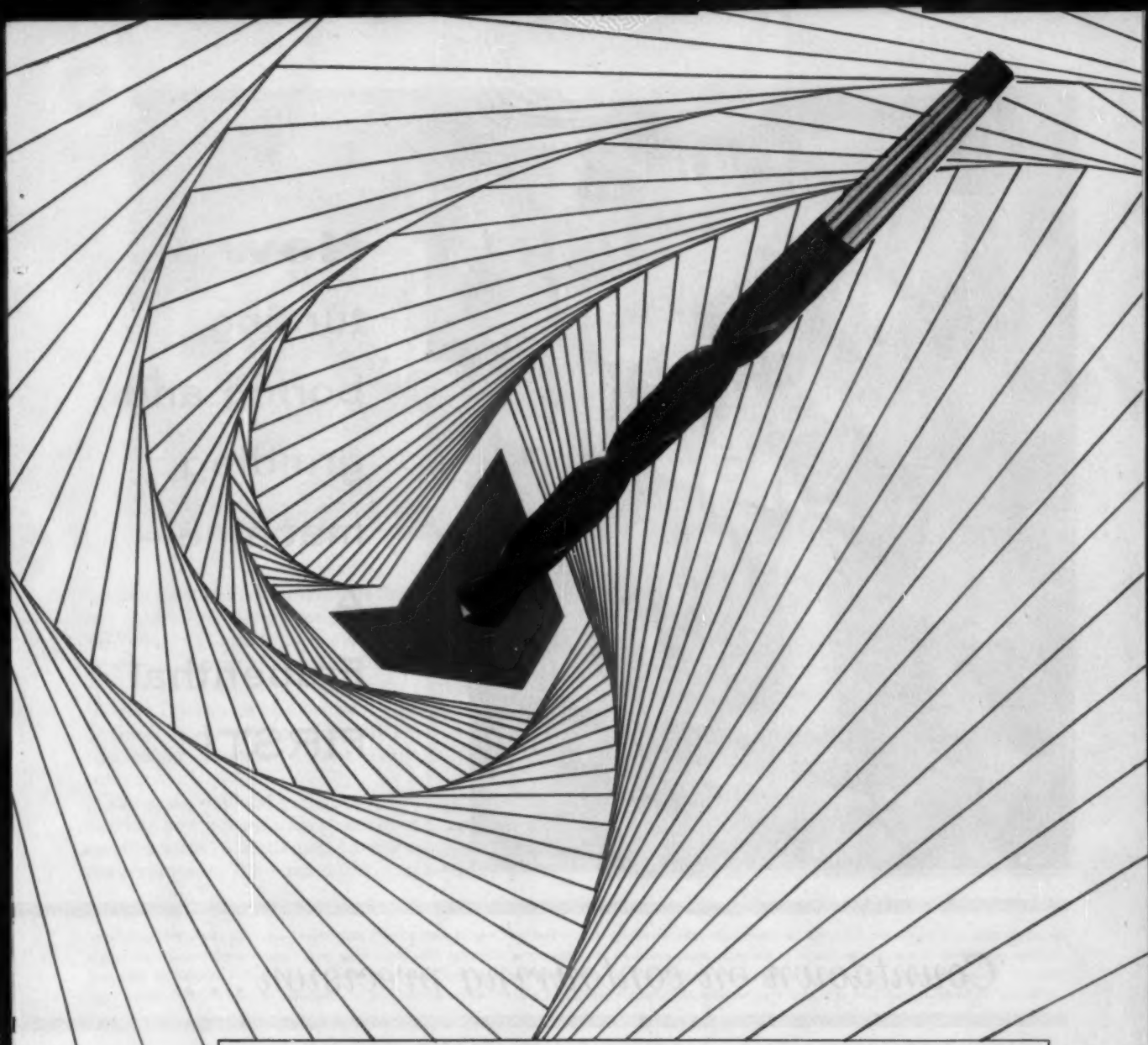
CARD

DIVISION OF UNION TWIST DRILL COMPANY

Serving you through the best distributors from coast to coast

36C.0.3

CIRCLE 177 READER SERVICE CARD



GEOMETRIC PROGRESSION SYMBOLIZES PRECISE DUPLICATION

CALCULATED TO CUT COSTS

A truly geometric pattern is followed in precisely duplicating each UNION cutting tool, according to type and size. In your plant exactly duplicated UNION drills will protect product quality and aid in reducing drill consumption. For high volume, high quality production, specify UNION drills, reamers, milling cutters, end mills, gear cutters, hobs, carbide tools, and inserted blade cutters. Available nationally through UNION Distributors and stocked in UNION warehouses in Atlanta, Chicago, Detroit, Fort Worth, Los Angeles, New York City, and San Francisco.

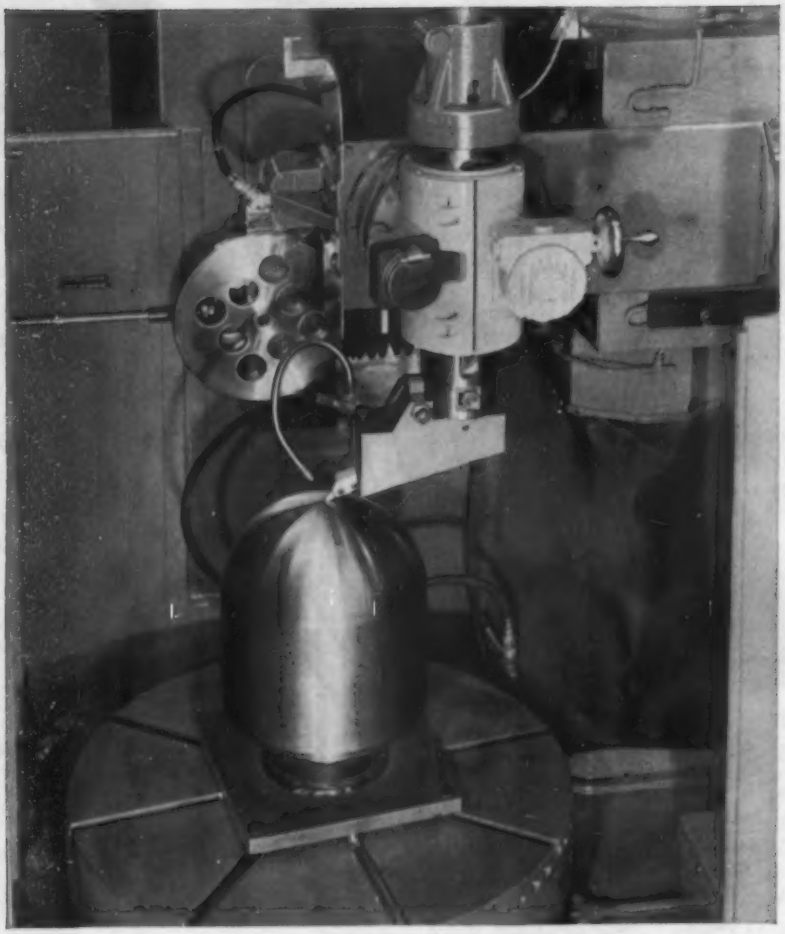
UTD

UNION

UNION TWIST DRILL COMPANY, Athol, Massachusetts

S. W. Card Division, Mansfield, Mass. Butterfield Division, Derby Line, Vt.

CIRCLE 178 READER SERVICE CARD



New turning, boring and grinding machine— A Frauenthal FIRST!

Countdown on contouring precision . . .

.OOO GUARA

The new Frauenthal electro-hydraulic tracer control incorporates super-precise recording facilities which assure contouring tolerances to .000150". Recorded are the accuracy of the follower to the tracer template and the machine slides.

This versatile 900 Series machine has a 30"-diameter table with maximum swing of 36". Maximum vertical slide travel — 32"; maximum vertical travel on manual turret slide — 3".

Custom-built 900 Series machine tool achieves space-age contouring accuracies not available in similar machines. Thanks to new electro-hydraulic tracer control, the precision-guaranteed 900 Series will hold a tolerance of ±.000150" on contoured surfaces. (Tolerances as close as ±100 millionths are possible on straight surfaces!) This ultraprecise contouring accuracy is not available with any similar unit.

Enjoying unusual versatility, Frauenthal's new turning and boring unit matches strict space-age specifications . . . anticipates tomorrow's precision requirements. The machine easily adapts to conventional grinding, turning, boring, milling, facing, counterboring, recessing and finishing.

You can bring your most difficult machining problems to Frauenthal with confidence. Imaginative Frauenthal engineers will creatively evaluate your machine tool needs. Contact Frauenthal now.

Frauenthal
DIVISION
THE KAYDON ENGINEERING CORP.
MUSKEGON, MICHIGAN, U. S. A.

Versatility of vertical machine design cuts floor-to-floor time • Two-axis tracer system holds stock removal constant per revolution regardless of stylus location on the contour • Cast work table with tee slots is ground flat to surface-plate accuracy to insure precise setup, measuring and installation of fixtures • Exceptionally efficient water-type heat exchanger and variable temperature control regulate the hydraulic system temperature within ± 1° to hold oil viscosity and maintain accurate tracing • Automatic force-feed lubrication • Unit can also be equipped for grinding.

150" NTEED

When the job calls for DIAMONDS...say SIMONDS

SIMONDS DIAMOND WHEELS

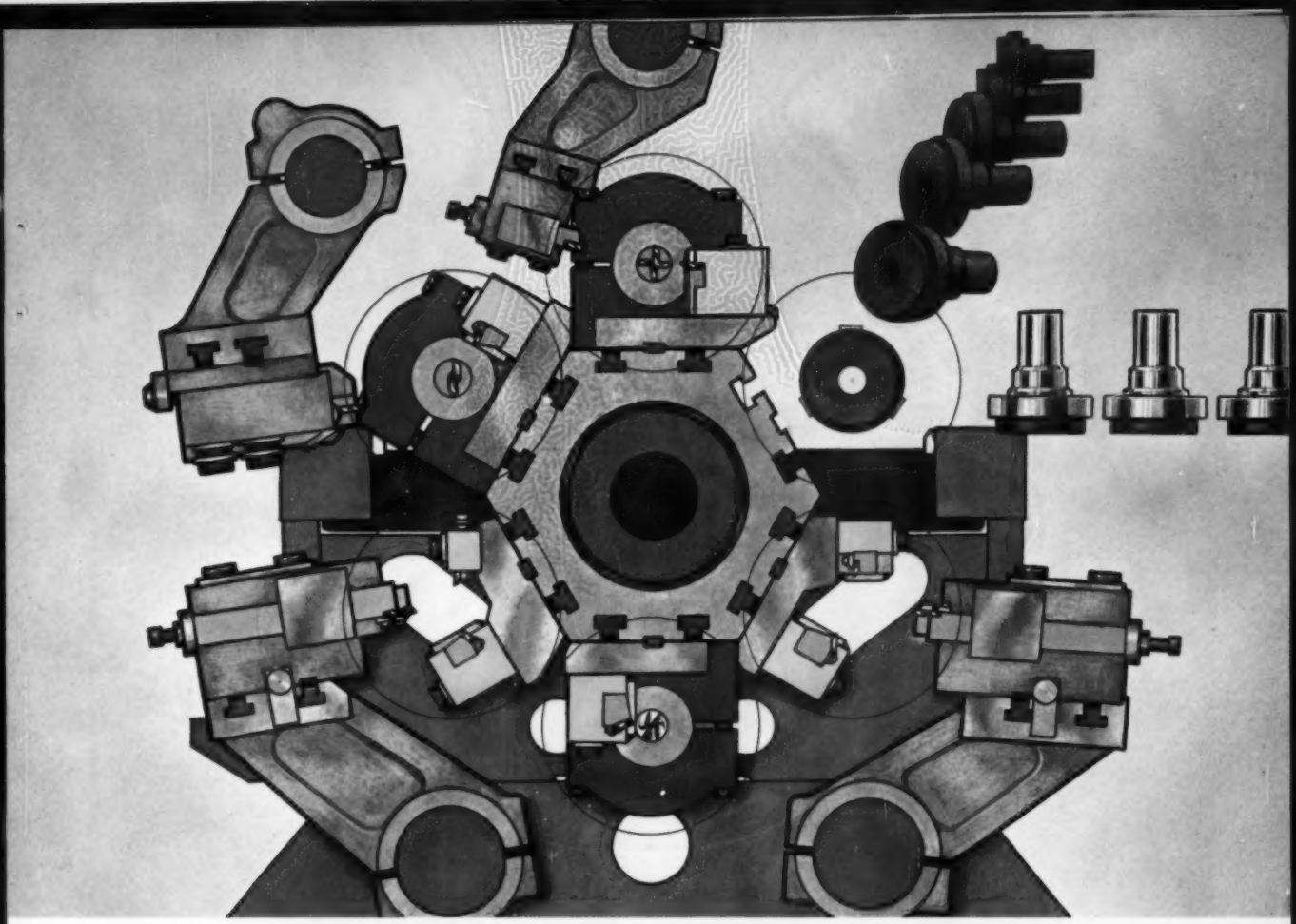
made with extra care
for extra value

man-made or natural diamonds

You get *extra* use from Simonds wheels because more of the diamonds are *productively* used for actual grinding. That's due to the extra care that goes into their manufacture . . . extra-demanding quality controls, modern techniques and the most accurate equipment . . . extra care that provides better balance and truer running, and consequently, fewer dressings. Special core material in resinoid bonded wheels also needs little or no dressing back as the diamond depth is consumed. Made with true and exact concentrations, and available in all shapes, sizes and bonds. Job-proved grain and grade specifications.
Send for Bulletin ESA 310

SIMONDS ABRASIVE CO.
PHILADELPHIA 37, PENNA.
COUNT ON / YOUR SIMONDS DISTRIBUTOR / FAST SERVICE • LOCAL STOCKS

WEST COAST PLANT: EL MONTE, CALIF.—BRANCHES: CHICAGO • DETROIT • LOS ANGELES • PHILADELPHIA • PORTLAND, ORE. • SAN FRANCISCO
SHREVEPORT—IN CANADA: GRINDING WHEELS DIVISION, SIMONDS CANADA SAW CO., LTD., BROCKVILLE, ONTARIO • ABRASIVE PLANT, ARVIDA, QUEBEC



Open secret of New Britain superiority

Wide-open design makes the most fundamental difference between a New Britain automatic chucking machine and other machines. It speaks for itself as a means of getting at the tooling, making adjustments and clearing chips.

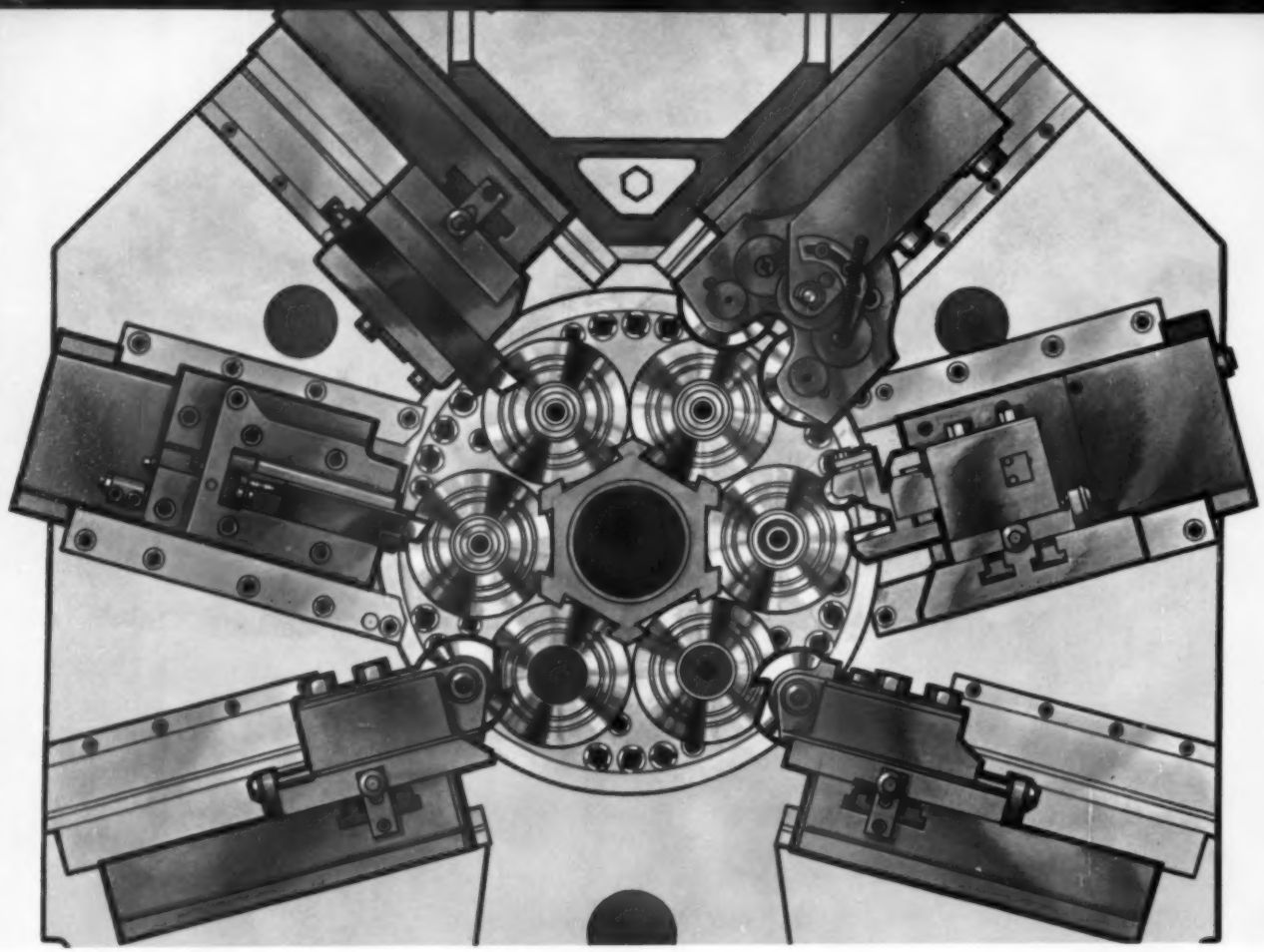
Massiveness, right from the floor up, is equally apparent and equally important in chucker work. You see it in the way the cutting tools make the heaviest cuts with a chatter-free smoothness that can't be duplicated.

Only New Britain provides a combination of longitudinal with transverse forming motion where needed. This versatility eliminates the need for second operation machines in many cases—particularly when a job is setup for double indexing for fast two-at-a-time production.

New Britain spares no pains to incorporate every new development to make chucker-type machining more profitable. The open-end design lends itself particularly well to magazine loading and unloading, for example, and many New Britains are being equipped to provide this feature.

Whenever a number of operations are required on cast or forged pieces, these massive, rugged, powerful machines offer great possibilities for savings through faster, more accurate, more reliable production. A new and complete catalog on the New Britain chucker line is just off the press. We would be very glad to send you your copy.

THE NEW BRITAIN MACHINE COMPANY
New Britain-Gridley Machine Division · New Britain, Connecticut



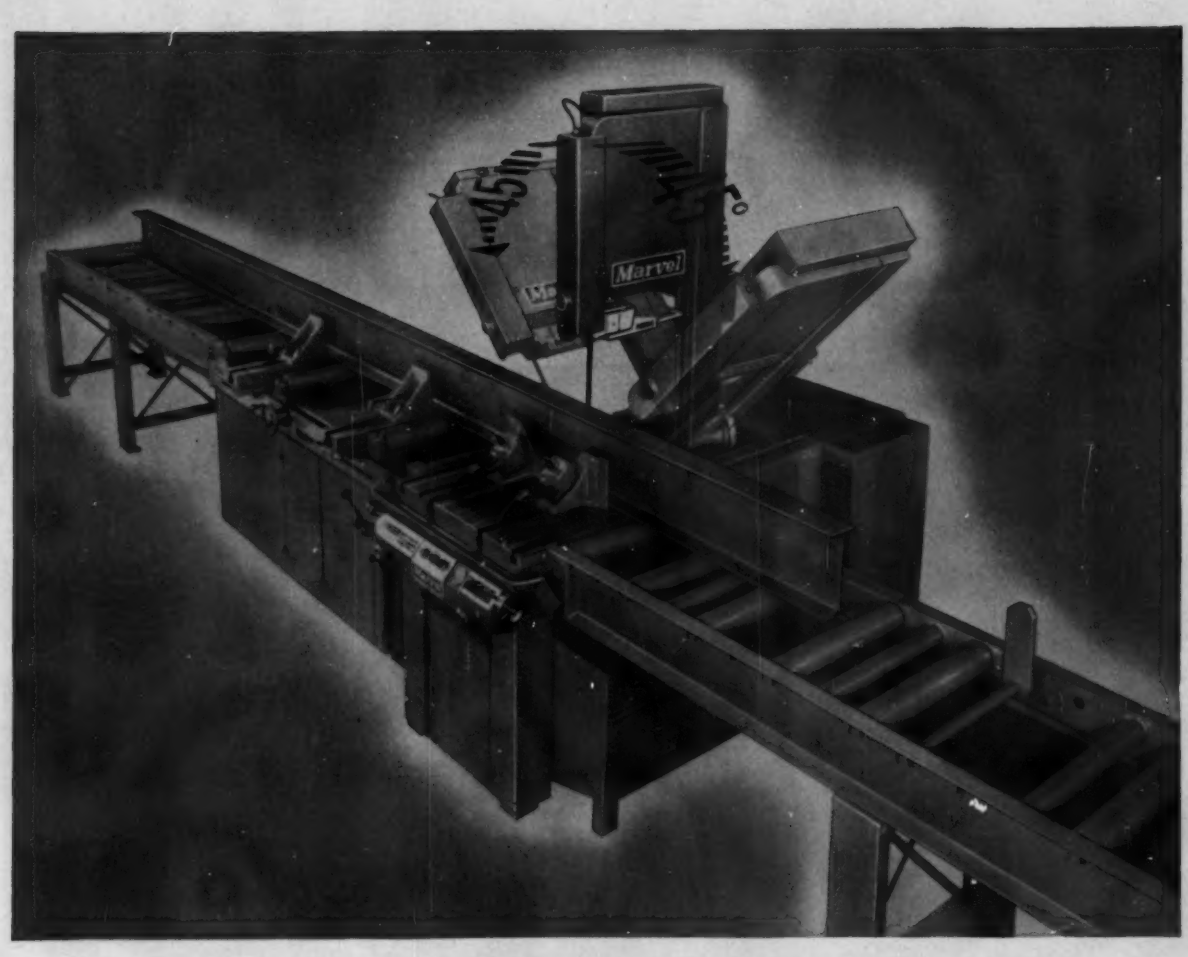
New Britain's answer to a serious threat

Overseas production of just about anything you care to name is making serious inroads on American domestic and foreign markets. It's no secret that European and Asian industry is catching up fast technologically—and they have a real competitive advantage in plenty of low cost skilled labor. While many foreign products are still inferior to those of domestic manufacture, this is far from true in all cases. The answer is, of course, increased productivity at lower cost.

In its all-new line of bar machines, New Britain has developed the most modern bar-turning units available. Five models in two different series are offered with capacities from 1¼″ to 5⅛″. These machines are designed for really fast, trouble-free, high-precision production. More operations per machine are possible than ever before. Wide open tool areas allow unlimited combinations of end working and forming tools. New Britains will stay new longer. The exclusive wear-preventing features so familiar to New Britain users have been retained and improved. Catalogs on both the small and large series machines are yours for the asking. After looking this literature over if you think one or more New Britains may help improve your competitive situation, we will be happy to review your prints and arrange a demonstration. No obligation, of course. Call us or call your local representative.

New Britain-Gridley Machine Division, The New Britain Machine Company, New Britain, Connecticut.

THE NEW BRITAIN MACHINE COMPANY
New Britain-Gridley Machine Division · New Britain, Connecticut



Tips Its Head To Cut Production Corners

Sawing 45° miters in any kind of material has always been a simple task for MARVEL Saws, but moving the work up automatically and making consecutive cuts on an angle was a problem, especially when the work was long and cumbersome.

This triple exposure photograph of a new MARVEL No. 81A All Hydraulic Heavy Duty Automatic Bar Feed Band Saw, illustrates how the upright head or column can be tipped 45° either right or left of vertical to make angle or miter cuts. The work is held stationary while the column, which carries the blade, is fed forward, meeting the work squarely to insure accurate cutting. After the cut is completed, the work is automatically moved up and measured, and another cut made.

Automatic miter cutting is just one of many exclusive universal features of these band saws. Designed to utilize every advantage of high speed steel band blades, MARVEL No. 81 Series Band Saws can handle almost any conceivable sawing job—from the smallest, most delicate work, up to 18" x 20" shapes.

Only the MARVEL No. 81 Band Saws have the "SURE-LINE" Automatic Accuracy Control (basic patent applied for) which literally steers a blade to make a straight cut. This unit extends usable blade life as much as 50%.

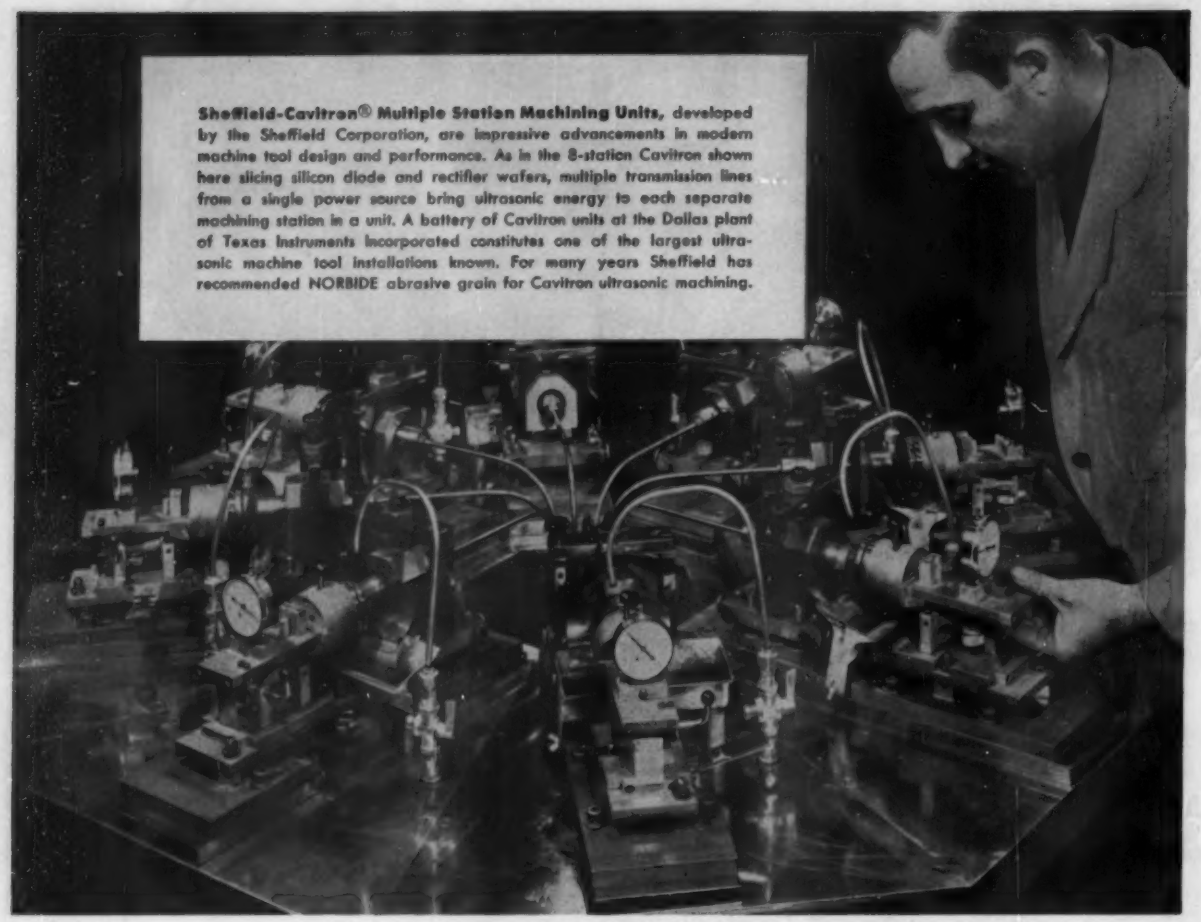
MARVEL No. 81 Series Band Saws are proving themselves daily, as the most versatile machine tools in production metalworking plants.

For complete details, or a demonstration of MARVEL Sawing Equipment, write: Armstrong-Blum Manufacturing Co., 5700 W. Bloomingdale Ave., Chicago 39, Ill.

MARVEL Metal Cutting SAWS
Better Machines-Better Blades

◄ CIRCLE 183 READER SERVICE CARD

▲ CIRCLE 184 READER SERVICE CARD



Sheffield-Cavitron® Multiple Station Machining Units, developed by the Sheffield Corporation, are impressive advancements in modern machine tool design and performance. As in the 8-station Cavitron shown here slicing silicon diode and rectifier wafers, multiple transmission lines from a single power source bring ultrasonic energy to each separate machining station in a unit. A battery of Cavitron units at the Dallas plant of Texas Instruments Incorporated constitutes one of the largest ultrasonic machine tool installations known. For many years Sheffield has recommended NORBIDE abrasive grain for Cavitron ultrasonic machining.

FOR ULTRASONIC MACHINING . . .

the best abrasive – NORBIDE Boron Carbide is now even better!*

Keeping pace with the development of ultrasonic machining to bring high precision to more and more applications, NORBIDE boron carbide is preferred as the ideal cutting agent for these rapidly increasing operations.

And now new Norton manufacturing techniques have brought improvements to NORBIDE abrasive . . . which bring even more advantages to ultrasonic machining than ever before!

Always recognized as second only to diamonds in hardness, and as much more suitable than silicon carbide grain, NORBIDE boron carbide grain now has greater freedom from impurities.

This means more effective, longer lasting cutting power in each ounce of NORBIDE boron carbide.

Remember: ultrasonic machining is rapidly spreading its advantages throughout industry — metalworking, electronics, fine glass, laboratory ware, jewelry and many other manufacturing fields. Materials machined include a wide range of metals, ceramics, refractories, etc. Operations include slicing, shaping, slotting, engraving, multi-drilling, etc. In all applications, on all materials, NORBIDE boron carbide is the most dependable abrasive for high precision, product quality and economy.

Your Norton Man can assist you in obtaining facts about how ultrasonic machining with NORBIDE abrasive can benefit your production. See your Norton Distributor or write to NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

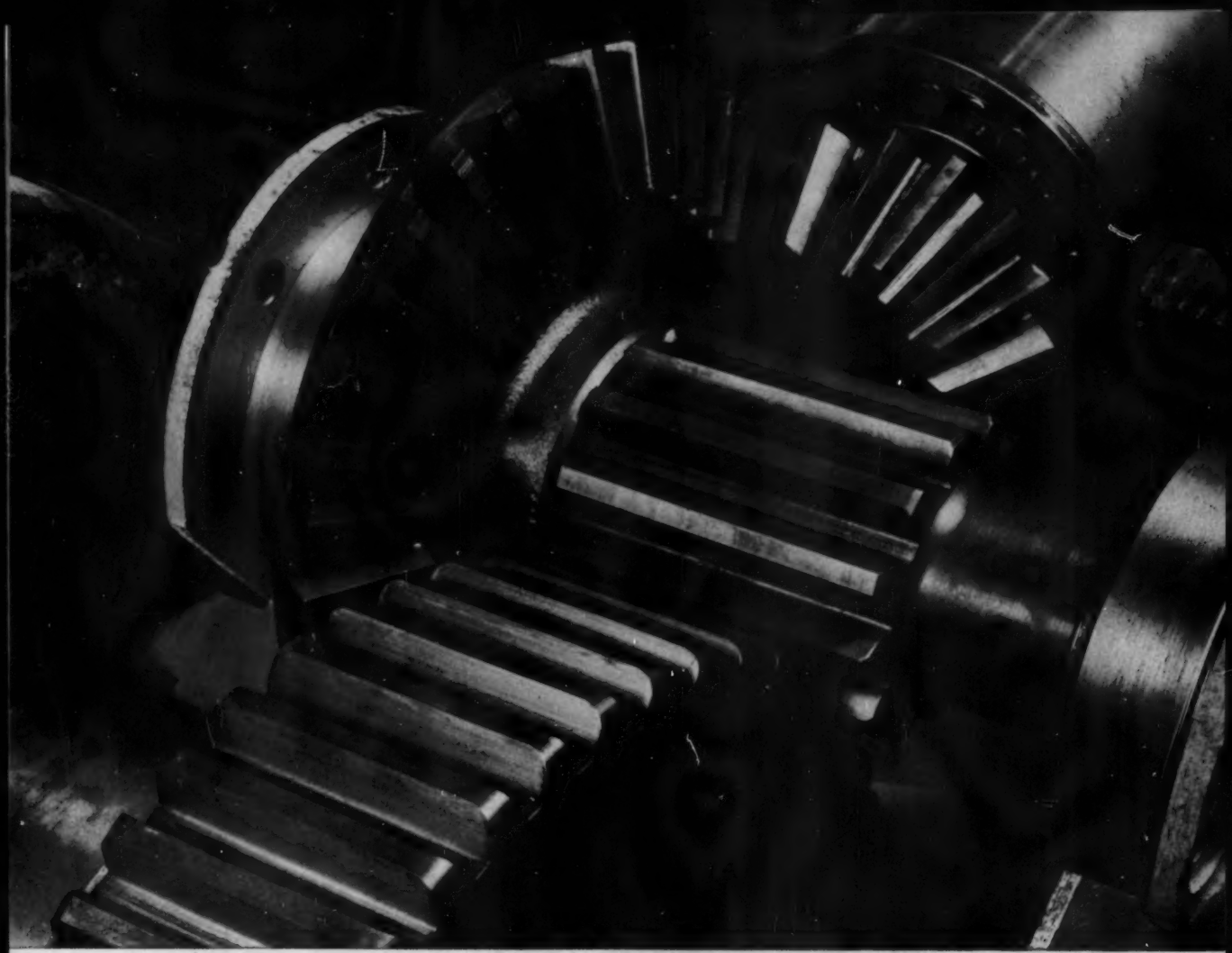
*Trade Mark Reg. U.S. Pat. Off. and Foreign Countries

NORTON
BORON CARBIDE

G-404

75 years of . . . **Making better products . . . to make your products better**

NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Electro-Chemicals — **BEHR-MANNING DIVISION:** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes



These gears drive the cutting head of a Lee-Norse continuous coal miner. They have superb toughness to resist impact and wear. They're made of AISI 4820, 4320, and 4817 alloy steels.

These teeth are not for chewing

Gear teeth aren't supposed to chew anything (especially each other) because it's so very *expensive.* A broken ten-dollar gear can cost a thousand dollars in down time—so it pays to use the very best alloy steels for gears and other highly stressed parts.

When we make USS Alloy Gear Steels, every production step has one purpose: to prevent failure in actual service. These premium steels forge and machine without distortion. They are dimensionally stable, and they come in the widest possible range of mechanical properties. Be sure to specify USS Alloy Gear Steels: Carburizing steels for toughness, shock and wear resistance; thorough-hardening steels for heavy loads at slow to medium speeds; cyaniding and nitriding steels for wear.

For information or metallurgical assistance, call our nearest sales office or United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

USS is a registered trademark

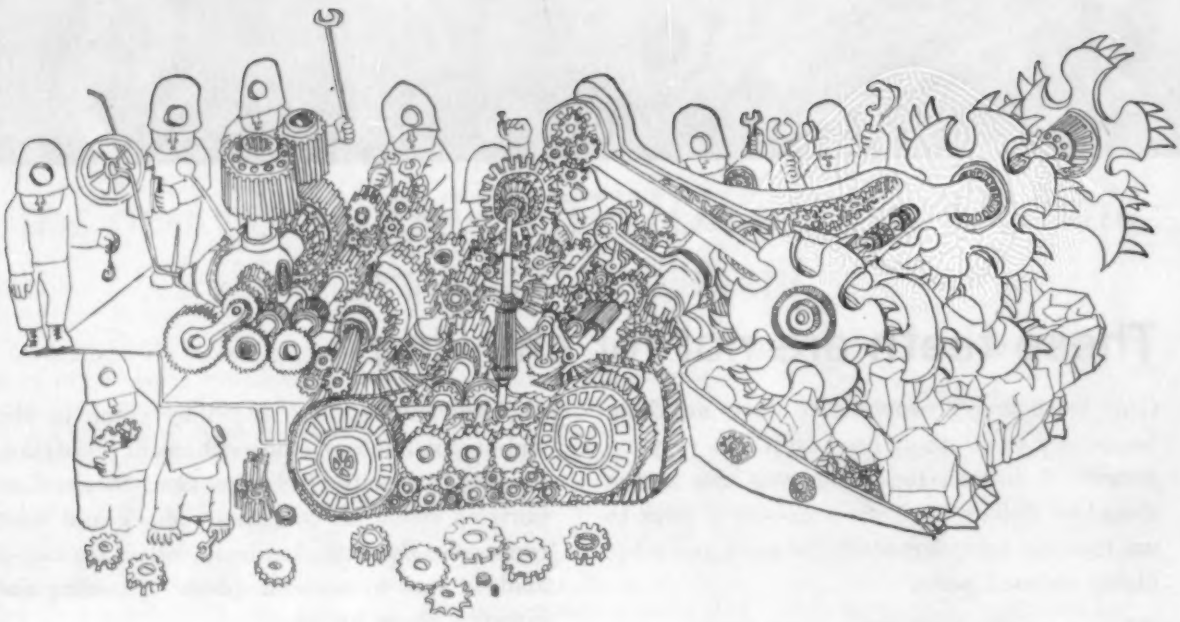
United States Steel Corporation—Pittsburgh
Columbia-Geneva Steel—San Francisco
Tennessee Coal & Iron—Fairfield, Alabama
United States Steel Supply—Steel Service Centers
United States Steel Export Company

United States Steel

USS

This mark tells you a product is made of modern, dependable Steel.

the digger's dilapidation



(or, How not to be a victim of tired gears)

She was a beauty when they brought her in. Shiny paint. Ferocious teeth that could chew out a whopping 5 tons of coal per minute. A drive that looked like it could rout out a vein from here to Medicine Hat, Montana, and back. At least that's the way it *looked*. Then one day fatigue set in. The old girl had tired gears. There were sounds like skis falling down stairs, a crack of doom and, wham, she stopped right in the middle of a bite. Busted gear.

Gear failure costs money, especially in terms of downtime and lost production. That's why it is essential to use *quality* alloy steel for gears, bearings, shafts and other highly stressed parts. Only the best is good enough when any failure is costly. The care and precision in making USS Alloy Gear Steels are for one purpose: prevention of failure. USS Alloy Gear Steels deliver dimensional stability. They come in a wide range of mechanical properties and processing capabilities.

The Lee-Norse Company's continuous coal miner will never be a victim of tired gears. Alloy steels such as 3310, 4815, 4820, 4320, 4340 and 8620 give its gears, pinions and shafts superb toughness and resistance to impact and wear. These cutter head drive gears are made of 4820, 4320 and 4817 alloy steels.

Be sure to specify USS Alloy Gear Steels for *any* of your gear requirements. Carburizing steels for toughness, shock and wear resistance; through-hardening steels for heavy loads at slow and medium speeds; cyaniding and nitriding steels for wear.

For more information and prompt metallurgical assistance, call our nearest sales office or United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

USS is a registered trademark

This mark tells you a product is made of modern, dependable Steel.

United States Steel Corporation—Pittsburgh
Columbia-Geneva Steel—San Francisco
Tennessee Coal & Iron—Fairfield, Alabama
United States Steel Supply—Steel Service Centers
United States Steel Export Company

United States Steel

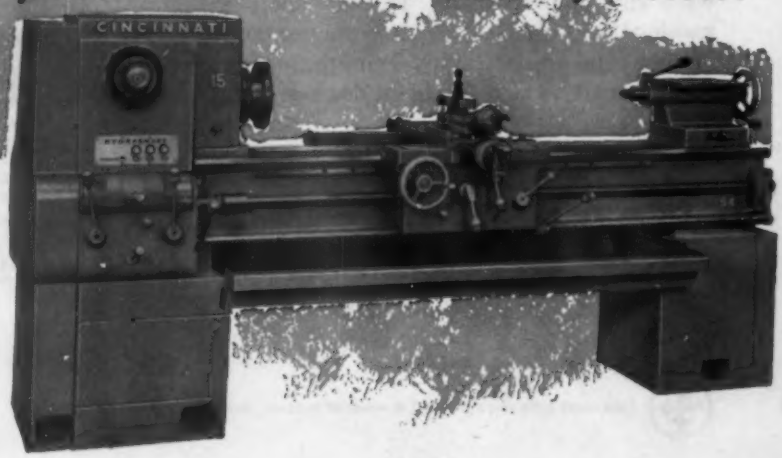
STOP

these men from stealing your profits.....

You know about this fellow . . . he's stealing "cash", and you do try to stop him.

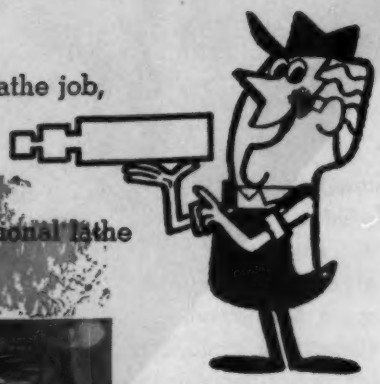
But **YOU** cause this theft . . .
you force this man to steal your profits . . .
make him add to labor and burden costs on most lathe jobs, no matter how hard he works.

The solution is easy:
make your operator a *cost-reducer* on ALL of his lathe jobs—shift him to HYDRASHIFT* Here's why.....



*HYDRASHIFT is Cincinnati's new lathe line with *the new way to change spindle speeds . . . hydraulically!*

Compare the machining of this typical lathe job,
two steps
and two necks
on the new HYDRASHIFT . . . on a conventional lathe



As second step is being cut, operator turns the dial to speed required for the necking cut.

Operator waits for machine to complete the step cuts.

Step cuts completed, operator changes to necking tool (he had it lying on the convenient Tray-Top) and positions tool for cut.

Step cuts completed, operator changes to necking tool and positions tool for cut.

Operator engages spindle lever and cuts the neck—*without leaving* apron.

Operator goes to headstock, shifts various levers to change to spindle speed for necking cut.

Necking cuts completed, operator changes tools for next workpiece.

Operator returns to apron, engages spindle lever, and cuts the neck.

Don't force your lathe operators to steal profits from your pockets—take a look at the new Cincinnati HYDRASHIFT Lathes at your nearby Cincinnati Lathe and Tool Dealer's showroom. If you can't reach him immediately, wire collect!

CINCINNATI LATHE AND TOOL CO. CINCINNATI 9, OHIO

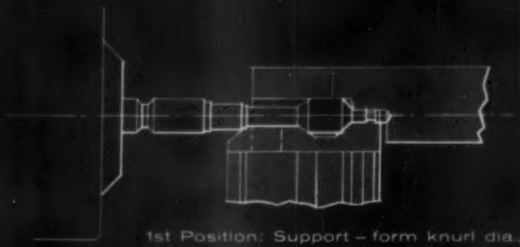
HYDRASHIFT Lathes/CINCINNATI Drilling Machines/SPIROPOINT Drill Sharpeners

Acme-Gridley Speed & Accuracy...

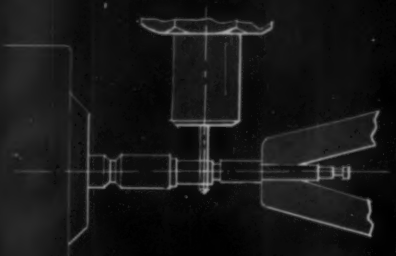
SLASHES TOTAL MACHINE TIME 76.4%

for E.F. Johnson Company

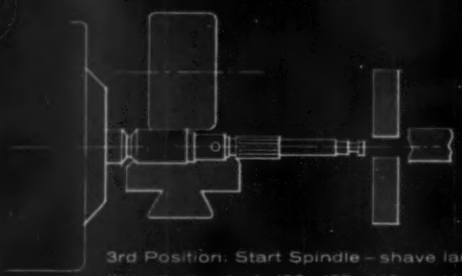
6th Position: Turn .075 dia. – form .165 and .198 dias. – mark for cut-off – support



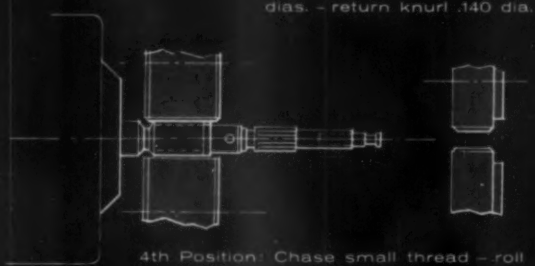
1st Position: Support – form knurl dia., .055 and .075 dias.



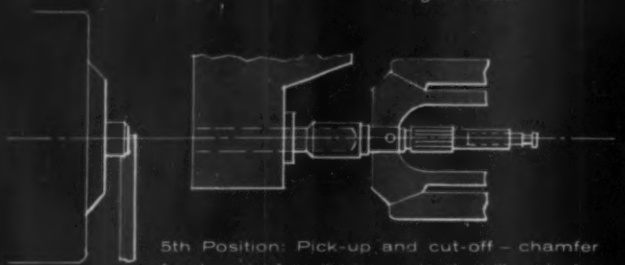
2nd Position: Stop spindle – cross drill – hollow-mill small thread dia.



3rd Position: Start Spindle – shave large thread dia. and .198, .165, .140 and .130 dias. – return knurl .140 dia. face end.



4th Position: Chase small thread – roll large thread

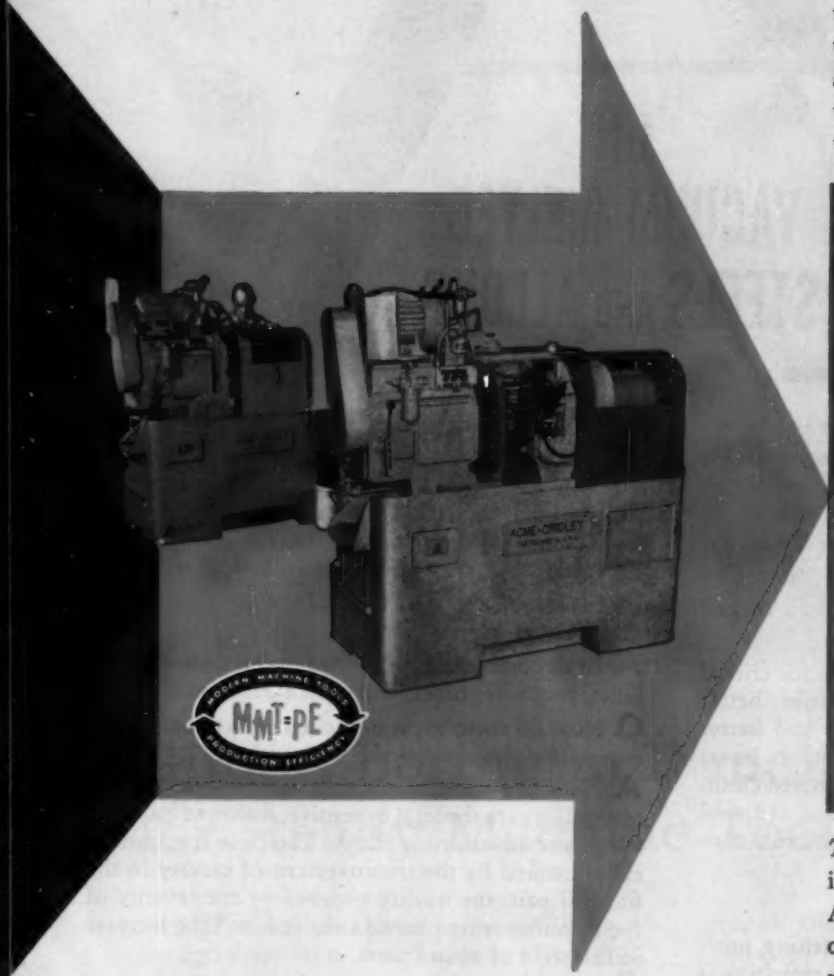


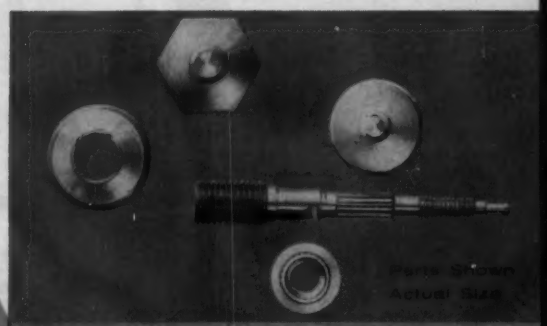
5th Position: Pick-up and cut-off – chamfer front end of next piece – back drill – eject – chamfer front end

Total Machine Time – 5 Seconds

. . . also . . . cost-per-piece is substantially reduced . . . part uniformity and quality definitely improved . . . scrappage all but eliminated.

This is the *record* of two Acme-Gridley 7/16" RA-6 Spindle Bar Automatics installed at the E. F. Johnson Company, Waseca, Minnesota. Producing some 15 intricate parts, like those shown, the rugged and versatile Acme-Gridleys continually meet the rigid specs of this well-known manufacturer; help make high quality products such as the Viking Messenger Citizen's Band two-way radio available at prices that fit the public's pocketbook.





Tangible production savings, like those realized by E. F. Johnson, are assured with Acme-Gridleys. In your plant, the 7/16" RA-6, or any of the world's most complete line of multiple-spindle automatic bar and chucking machines will show you a new dimension in mass production efficiency.

National Acme

The National Acme Company
171 E. 131st Street
Cleveland 8, Ohio

Sales Offices: Newark 2, N.J.; Chicago 6, Ill.; Detroit 27, Mich.

CIRCLE 192 READER SERVICE CARD

A-L ANSWERS YOUR QUESTIONS ON VACUUM MELTED STEELS AND ALLOYS

Q. Where are vacuum melted alloys best suited?

A. For exacting applications—including materials for rockets, missiles, and jet engines. And other places where expensive machined parts are involved. In highly stressed parts where failure is highly costly. Where increased reliability is vital.

Q. What are the advantages of A-L vacuum melted alloys?

A. You get parts with optimum quality for critical applications—higher mechanical properties, better fatigue strength, improved toughness, and better transverse ductility. You also get maximum insurance against internal defects through improved cleanliness and decreased gas content. And hot and cold workability are improved, the material is more homogeneous, and properties are better.

Q. How are these metals made?

A. A-L uses all three of the vacuum melting processes. Consumable electrode vacuum arc remelting is used to produce A-L Consutrode® steels and alloys in ingots up to 20,000 pounds in weight. Induction vacuum melting is used to produce 2,000 pound heats of Allegheny Ludlum Invac materials. And remelting Invac electrode stock by the consumable electrode process produces A-L Invacutrode steels and alloys that have the best possible combination of chemistry control, cleanliness, and homogeneity.

Q. Specifically, what metals are available in A-L's premium quality melting?

A. Most of the steels and special alloys—low alloy steels, bearing steels, stainless steels, tool and die steels, and high temperature steels and alloys.

Q. In what forms are these A-L special steels available?

A. In all commercial mill forms—plates, sheet, strip, billet, bar, wire, tubes, and even extrusions.

Q. How do these vacuum melted alloys compare in cost with ordinary alloys?

A. Naturally vacuum melting costs more. Consutrode alloys are the least expensive, followed by Invac alloys and Invacutrode alloys. Their use is economically justified by the improvement of quality in the finished part, the quality required by the severity of the manufacturing process involved, and the increase in the yield of sound parts.

Q. Where can I get more information?

A. Ask your A-L representative for your copy of "Modern Melting at Allegheny Ludlum." It gives technical data on the new melting techniques and quality improvements in materials. Or write: ***Allegheny Ludlum Steel Corporation, Oliver Bldg., Pittsburgh 22, Pennsylvania. Address Dept. AM-10.***

ALLEGHENY LUDLUM

PIONEERING on the Horizons of Steel

2258

courtesy Ready Machine Tool & Die Co., Inc.

Gilbert boring mill makes money for Ready Machine Tool & Die

"This 5" Cincinnati Gilbert boring mill is already making money for us, and that's why we bought it," says C. P. Ready, President of Ready Machine Tool & Die Co., Inc., Connersville, Ind.

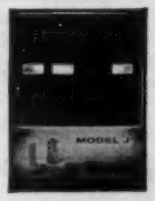
"For instance, with its precision positioning system, we can lay out holes directly from a print. This saves all the time we used to take to make and use templates."

And there are other things that make this Cincinnati Gilbert a profitable machine for tool and die shops. Plenty of direct power at the tool for heavy cuts. Accuracy for the tightest specs. Capacity for big work pieces.

Installed in the Ready plant are two of these modern machines; one table type, one floor type—proof of their confidence in Gilberts.

The Cincinnati Gilbert Machine Tool Co., 3340 Beekman St., Cincinnati 23, Ohio.

Write for new catalog



GILBERT

CIRCLE 194 READER SERVICE CARD

JONES & LAMSON "AUTOMATION"

the man who needs a new machine tool is already paying for it

New numerically-controlled turret lathe shatters idle time . . . is ideal for short runs

At the last Machine Tool Exposition, five years ago, Jones & Lamson exhibited an automatic tape-controlled turret lathe. It created a sensation and attracted thousands of fascinated spectators. Many of them wanted to buy. But the machine wasn't for sale. Why? Because there were still "bugs" in it to be ironed out, and our reputation is too valuable to risk on an "almost" product.

In the five years since, J & L still kept this lathe off the market, pending its complete development and proving-out. Now, it is ready to be shown, ready to be sold, ready to help you attain new production efficiency.

The new J & L numerically-controlled turret lathe is a complete redesign job. The sound features of the early prototype have been retained, and all question marks have been eliminated. In every way, this is a real beauty!

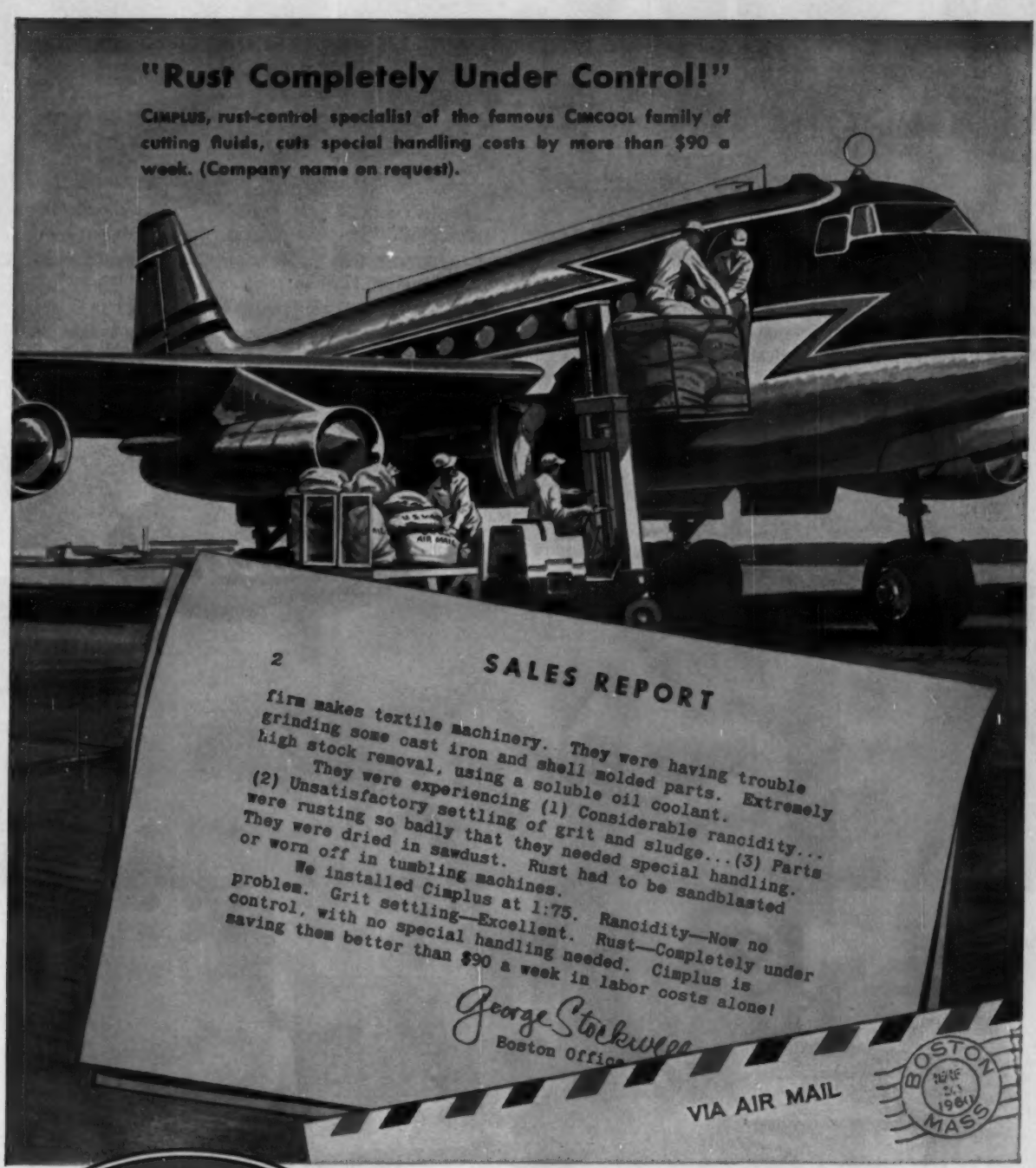
It's designed especially for short run production and top economy. It has the capacity of a No. 5 machine, 2½ x 24 in., and has three turrets (one hexagon and two square) which accept up to 14 preset tools. A set of tools plus the tape can be "packaged", ready for set-up when needed.

This lathe can be set up as either a bar machine or a chucker, in 10 to 15 min. It positions within .001", repeats to .0005". Drive motor is 30 HP, with spindle speeds of 40 to 2000 rpm in 24 steps. Feed rates for carriage and saddle are .750" to 30.0" per minute in 16 steps, plus fast motion. Cross-slide operates at one-half these rates. Tape input information may be adjusted for extended tool life and size control by manual dials on the control panel. Productivity is increased 25 to 30% over standard cycle time. Even the automatic bar feed is programmed from the tape. See it at Chicago, or write for advance information now. Jones & Lamson Machine Company, 502 Clinton Street, Springfield, Vermont.

Turret Lathes • Automatic Lathes • Tape Controlled Machines • Thread & Form Grinders • Optical Comparators • Thread Tools

"Rust Completely Under Control!"

CIMPLUS, rust-control specialist of the famous CIMCOOL family of cutting fluids, cuts special handling costs by more than $90 a week. (Company name on request).



2 **SALES REPORT**

firm makes textile machinery. They were having trouble grinding some cast iron and shell molded parts. Extremely high stock removal, using a soluble oil coolant.

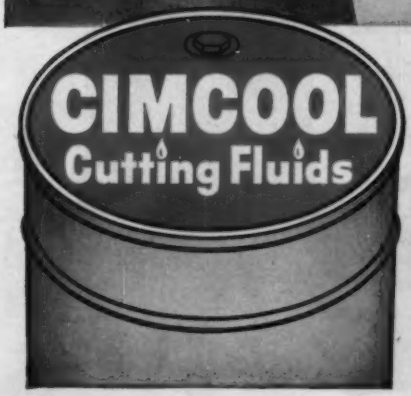
They were experiencing (1) Considerable rancidity... (2) Unsatisfactory settling of grit and sludge...(3) Parts were rusting so badly that they needed special handling. They were dried in sawdust. Rust had to be sandblasted or worn off in tumbling machines.

We installed Cimplus at 1:75. Rancidity—Now no problem. Grit settling—Excellent. Rust—Completely under control, with no special handling needed. Cimplus is saving them better than $90 a week in labor costs alone!

George Stockwell
Boston Office

VIA AIR MAIL

BOSTON MASS 1961



FOR 100% OF ALL METAL CUTTING JOBS

Production-proved products of The Cincinnati Milling Machine Co.

CIMCOOL 52 Concentrate — The pink fluid which covers 85% of all metal cutting jobs.
CIMPERIAL® — Newest in the famous, industry-proven line of CIMCOOL® Cutting Fluids.
CIMPLUS — The transparent grinding fluid which provides exceptional rust control.
CIMCUT Concentrates (AA, NC, 55) — For every job requiring an oil-base cutting fluid.
ALSO — CIMCOOL Tapping Compound — CIMCOOL Bactericide — CIMCOOL Machine Cleaner.

For full information on the complete family of CIMCOOL Cutting Fluids, call your CIMCOOL Distributor. Or contact Cincinnati Milling Products Division, Cincinnati 9, Ohio.

®Trade Marks Reg. U. S. Pat. Off.

6 precision spindles by Avey

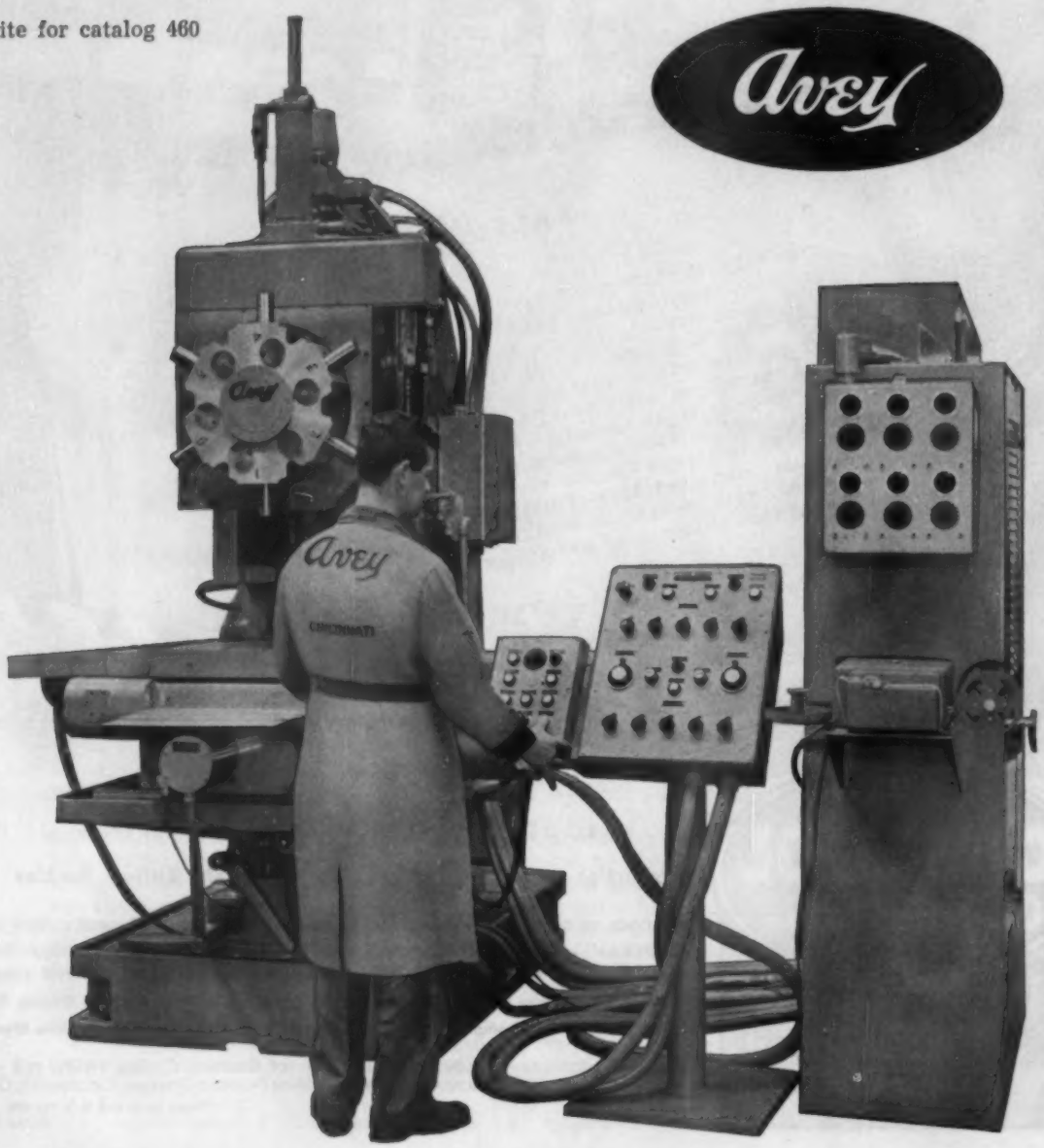
The reliability of the Avey 250 Turret-Dex matches the quality of the thousands of Avey drilling, tapping, and production machines which preceded it. It is available as either an automatic machine or numerically-controlled with rotary or two-axis positioning table. Pre-selected speeds, feeds, rapid advance, and tapping cycles. Automatic depth control for all spindles.

All spindles may be skip indexed. Automatic turret clamping. Positive spindle location. Rigid one-piece spindles, mounted in "O" precision taper roller bearings. Capacity up to 1¼" in steel.

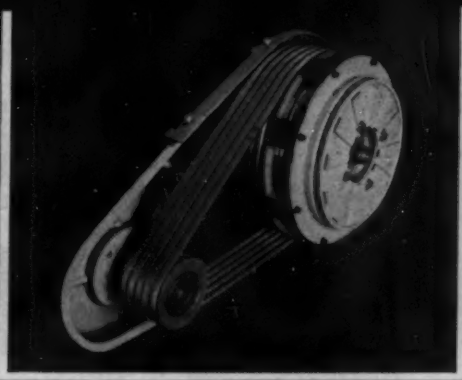
The Avey Turret-Dex makes it more clear than ever that, for your drilling requirements, "Avey makes the right one for Avey makes them all." The Avey Division, Motch & Merryweather Machinery Co., Box 1264, Cincinnati 1, Ohio.

Write for catalog 460

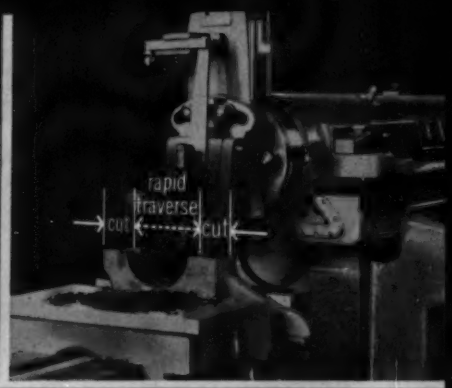
Avey



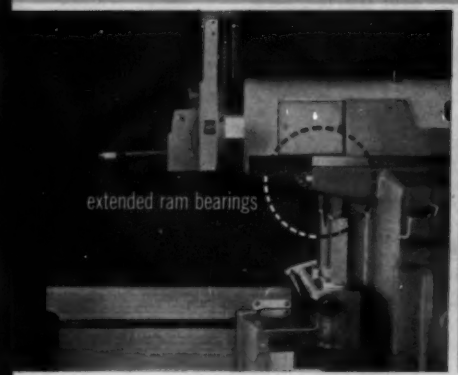
1. This 2" cut, .030" feed, proves the ability of the Cincinnati's 50 psi automatic lubrication to maintain oil films under the heaviest loads.



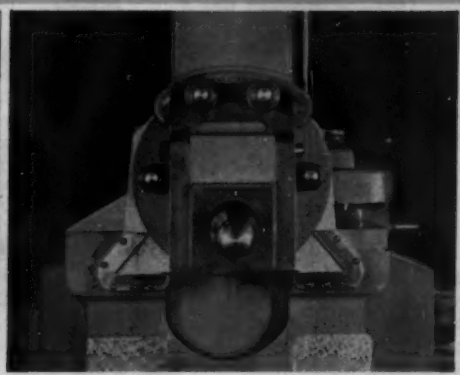
2. Brushless electromagnetic brake and clutch insure fast, easy operation of the ram without grab. They never need adjustment.



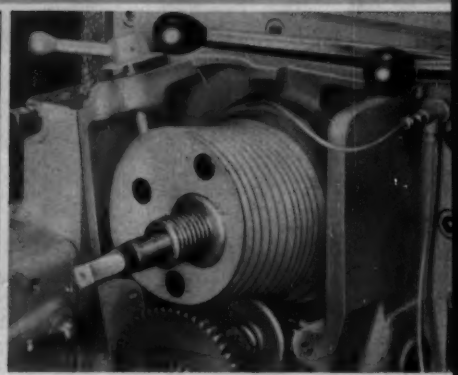
3. Both vertical and horizontal rapid traverse are standard Cincinnati features which profitably reduce time between each cut.



4. Extended ramway bearings increase ram support and minimize wear. Full table clearance to column provides the closest-coupled combination in the field.



5. Solid ramways, free of joints, hold the accuracy of Cincinnati shapers longer than others. Vee ways are cast integrally with the column for extra strength.



6. Individual cams for each feed, with follower always in contact give you a smooth (instead of a "bump") feed; results in superior finish on every job.

payoff features

MAKE CINCINNATI® SHAPERS YOUR BEST CHOICE

CIRCLE 198 READER SERVICE CARD

Shapers / Shears / Press Brakes

THE CINCINNATI SHAPER CO.

Cincinnati 11, Ohio, U.S.A.

In Scotland: The Cincinnati Shaper Co., Ltd., Glasgow

YOUR MOST OVERPAID OPERATOR

Are you *sure* you are making full use of the manpower and the machine productivity you are paying for? Are you handicapping your operator—tying him to inefficient, obsolete equipment? You may be doing just that, even though your equipment is just ten years old—for the average ten-year-old is only 60% as efficient as its 1960 successor.

AUTOMATIC LATHES CUT COSTS

With increased competition and rising costs, increased production efficiency is vital if profit levels are to be maintained. More and more plants are turning to the advantages of automatic lathes.

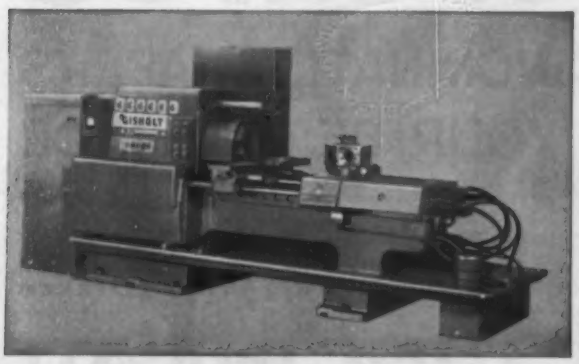
Lower costs, less dependence on operator skill, faster production on a wide variety of jobs—these are just a few of the many benefits offered by the Gisholt family of automatic lathes.

BOOST OPERATOR PRODUCTIVITY

These new Gisholts handle intricate machining steps in rapid sequence—automatically—allowing your operators to handle two or more machines without extra effort.

Get all the facts now—call your Gisholt Representative or write for literature on the Gisholt machines shown—the Fastermatic with new FeeDial® control and the AR Turret Lathe.

Gisholt MASTERLINE AR®
Automatic Ram Turret Lathe

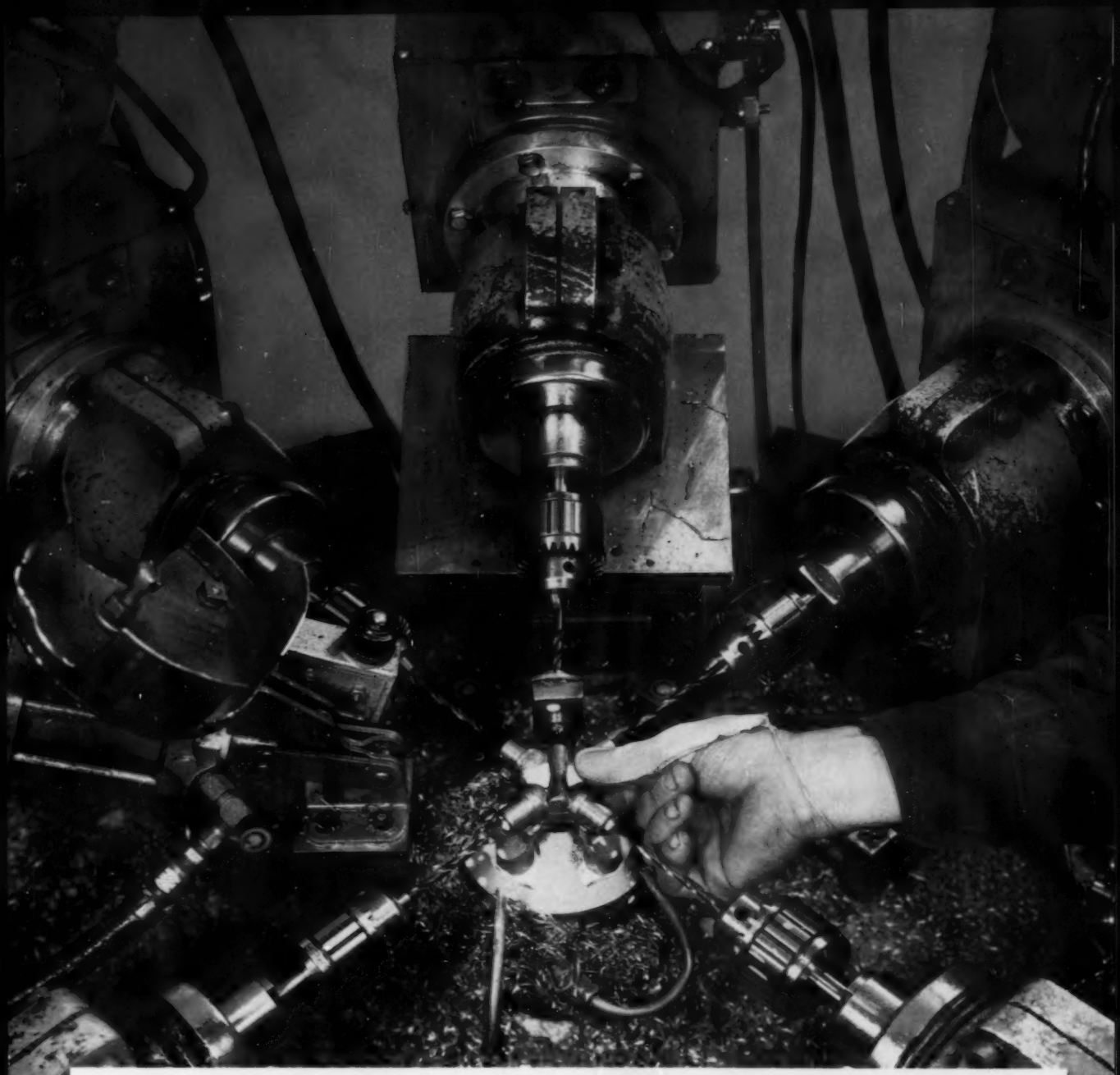


Investigate Gisholt's Extended Payment and Leasing Plans

Turret Lathes • Automatic Lathes • Balancers • Superfinishers • Threading Lathes • *Factory-Rebuilt Machines with New-Machine Guarantee*

GISHOLT® MACHINE COMPANY
Madison 10, Wisconsin

CIRCLE 200 READER SERVICE CARD ►



FAST AS THE EYE CAN FOLLOW

Drilling five 1⅛" deep holes at once in forged steel "spiders" for universal joints, these drills move in and out about as fast as the eye can follow on this high production job at the Saco-Lowell Automotive Division plant in Saco, Maine.

At this speed, even a few minutes down time means considerable loss of production. That's why they insist on quality tools, tools they can depend on to stand up day in and day out, month after month, tools that are uniform order after order.

Specially researched GREENFIELD-AMPCO drills have been on this operation longer than any other make in the long history of this gruelling job.

GREENFIELD TAP & DIE GREENFIELD, MASSACHUSETTS

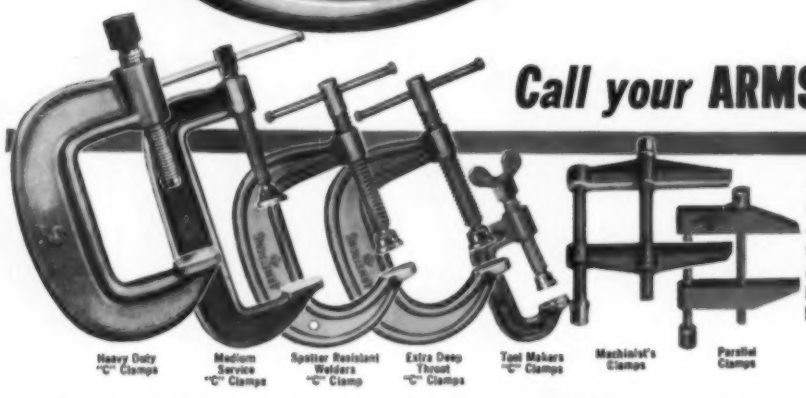
New ARMSTRONG Swivel Pad can't come off

Now ARMSTRONG deep throat "C" Clamps have the new (Pat. apd. for) ARMSTRONG Ball-joint Swivel Pad. This "C" Clamp pad, developed by ARMSTRONG Engineers, is tougher than any on the market. Rigorous testing in our own plant first proved this fact, and field tests in factories throughout the country have confirmed our own test results.

Here's Why it's STRONGER . . .

The lip of the opening in the ARMSTRONG Ball-joint Swivel Pad is undercut so that when the ball of the screw is inserted, and the lip is permanently forced down, a solid steel wall is formed, inside the pad cavity, completely encircling the ball.

This wall of steel makes it impossible for the pad to come off the screw during normal use. In fact, our tests have proved that it is virtually impossible to intentionally knock the pad off with a hammer —yet the pad is free to swivel through an arc of approximately 40°.



Call your ARMSTRONG Distributor

Your ARMSTRONG Distributor can offer delivery from stock on this "400-Series" deep throat, drop-forged "C" Clamp with the new Ball-joint Swivel Pad. He also carries in stock the other styles of clamps in the ARMSTRONG Line—the broadest line of drop forged "C" Clamps.

ARMSTRONG BROS. TOOL CO., 5215 W. ARMSTRONG AVE. CHICAGO 46, ILLINOIS

▲ CIRCLE 201 READER SERVICE CARD

CIRCLE 202 READER SERVICE CARD ►

VERTICAL GRINDING MACHINES

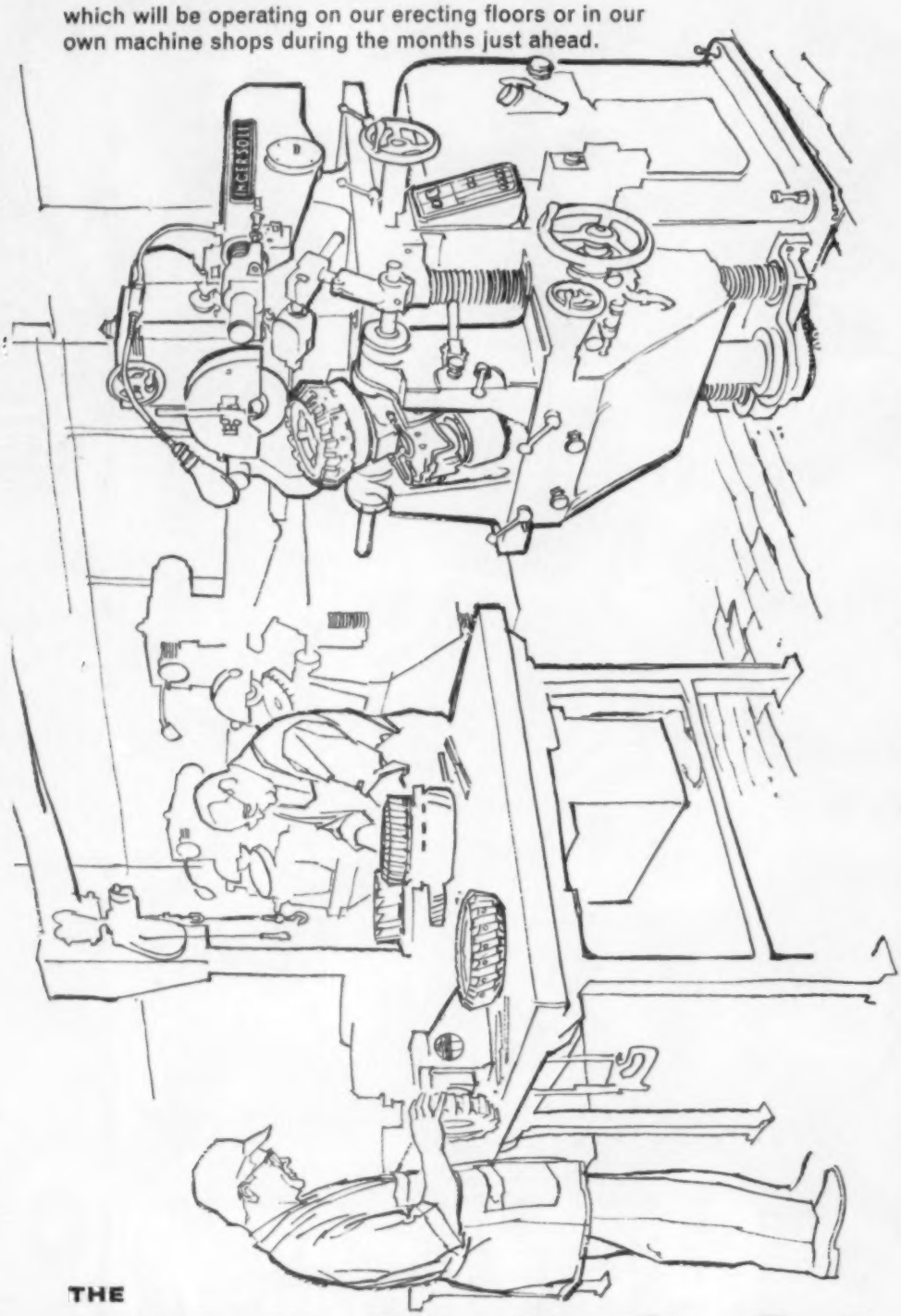
BERTHIEZ

NEW AT INGERSOLL....

This is one of a number of

NEW INGERSOLL MACHINES

which will be operating on our erecting floors or in our own machine shops during the months just ahead.



A NEW AUTOMATIC CUTTER GRINDER: Cam control of the grinding action makes it possible to control and repeat correct grinds indefinitely, thereby reducing production losses which result when cutters are poorly or inconsistently ground. One man can operate three of these new Ingersoll grinders, which are heavy, precision machines, kept maintenance-free by complete dust protection of moving parts. Using the machine itself to cut its own cams, the operator takes only a short time to produce a cam and completely set up the machine for grinding a new cutter.

THE

INGERSOLL

MILLING MACHINE COMPANY ROCKFORD, ILLINOIS

NEW

CAPEWELL

COILGUARD
band saw dispenser

EASIER TO STOCK, IDENTIFY AND USE

★ Coilguard is designed and engineered to guarantee smooth easy dispensing and recoiling. Cut end does not protrude.

★ Coilguard's high impact plastic protects band saws in transit and in the warehouse. Two-way labeling permits identification when stacked vertically or flat.

★ Special nesting pins allow "shoulder to shoulder" stocking. Hex shape prevents rolling.

★ Through center hole facilitates handling, is ideal for mounting on pegs or pipes for dispensing.

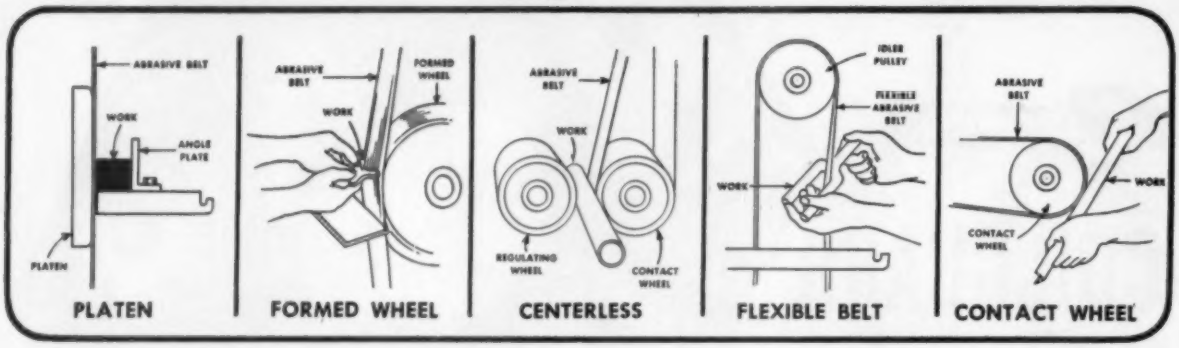
Only Capewell Distributors carry bandsaws in the convenient Coilguard package. One more reason why your Capewell Distributor should be your source for all the saws you need—hand hack saws, power hack saws, band saws and hole saws.

INDUSTRIAL DISTRIBUTORS · THE RIGHT HAND OF PRODUCTION

CAPEWELL 1881

THE CAPEWELL MFG. CO., HARTFORD 2, CONN.

BELT GRINDING: opportunity unlimited for faster finishing and metal removal



The opportunities for application of Sundstrand Engelberg precision abrasive belt grinders to improve quantity and quality of work are a stimulus to the imagination of creative methods men.

The belt grinding principle provides exceptionally rapid stock removal — up to three pounds of non-ferrous metal per minute! It speeds production and reduces costs because on most jobs it's from two to eight times faster. Setups are simple . . . tool dressing or grinding is eliminated . . . change-over takes but a few minutes . . . fixturing is simpler . . . and surface finish normally is markedly improved.

Wet and dry belt types are available for every requirement from toolroom work to automatic production of as high as 15,000 parts or more per hour.

A few of the many models of Sundstrand-Engelberg grinders are illustrated below. For more complete information, ask for descriptive literature.

Utility bench-type — used as contact wheel, flexible belt, or platen grinder.
Centerless wet belt grinder — for stock 1/16" to 2¾".
Centerless belt grinder — through-feeds both ways — for stock to 8½" dia. — no limit on length.
Contour grinder-polisher — roughing and finishing — for hand- or fixture-held work.
Wet-dry belt grinder for mass production — 14,000 or more small parts per hour.
Multiple-head conveyor-type — rough grind to final polish in a single pass — any number of heads.
Wet-dry belt-type for platen or contact wheel grinding.
Rotary table platen-type — operator loads and unloads without interrupting production.

SUNDSTRAND ENGELBERG

SUNDSTRAND-AMERICAN BROACH

ANN ARBOR, MICHIGAN • DIVISION OF SUNDSTRAND CORPORATION

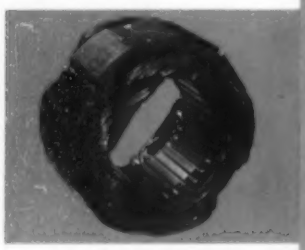
A NEW Duty Master FHP.

for heavy-duty industrial use

RELIANCE | **MASTER**

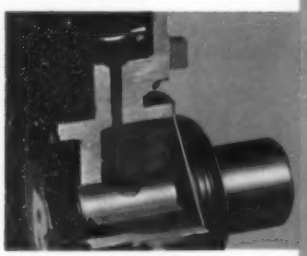
ELECTRIC AND ENGINEERING COMPANY | ELECTRIC COMPANY DIVISION

A NEW Duty Master FHP.

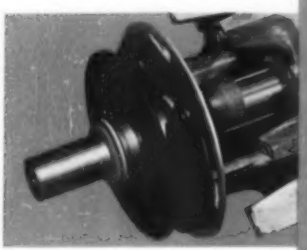


PROTECTED STATOR

TERMINAL BOARD



SLEEVE BEARING



CENTRIFUGAL CUT-OUT

TOUGH...COMPACT...COOL!

A motor that combines new, most-wanted features at no extra cost

Duty Master:

This motor is tough all over . . . deliberately designed for heavy industrial duty. Frame is rolled from steel—end shields cast from an aluminum alloy specifically selected for strength. Ball bearings are double-shielded, with lubricant packed into the bearing for life. Sleeve bearings are steel-backed and babbitt-lined for low friction and long wear. "Permawick" oil retaining material provides maximum lubrication to these bearings. Rotor is pressure-cast from high purity, low-resistance aluminum. Varnish impregnated stator resists moisture . . . and adds strength to windings.

Duty Master:

More power per pound . . . simple installation, 33% lighter than other preceding motor designs. Good design and materials make the difference. Makers of motor-driven products save on shipping and handling costs. Duty Master's light weight and small size make possible lighter, less complex mounting on equipment. Terminal board provides easy power connection in the front end shield. Cover plate quickly removable. Motor rotation easily reversed by interchanging slip-on connections.

Duty Master:

Up to 10% cooler than other comparably rated motors . . . yet gives you maximum protection. High load capacity results from new, effective ventilation of critical heat sources. Laminations, coils and rotor are literally rinsed with cooling air through new end shield design. In totally-enclosed, non-ventilated motors, the fan, cast integrally with rotor, circulates the air within the motor at a rate appropriate to efficient transfer of heat to motor frame and end shield. And load carrying capacity of the totally-enclosed fan-cooled motor is increased by a fan and shroud directing air over the frame and end shield.

Duty Master:

Quiet . . . Smooth . . . Positive. Resilient mounting composed of metal-rimmed, rubber-cushioning rings that encircle the bearing hubs on each end and support the motor. Motor can be mounted in any position. Single phase starter winding circuit automatically opens at 80% of full load speed. Action is quiet and positive.

Available now in 48 and 56 frame sizes, from conveniently located stocks. Duty Master FHP. is made in 1/6, 1/6, 1/4, 1/3, 1/2 and 3/4 hp. capacitor-start, split-phase and polyphase for 48 and 56 frames; repulsion-start induction-run in 56 frame. Your Reliance Sales Engineer or Distributor has all the facts at his finger tips. Call him or write for Bulletin B-2514. It will be sent to you promptly. B-1010

Product of the combined resources of Reliance Electric and Engineering Company and its Master and Reeves Divisions

RELIANCE ELECTRIC AND ENGINEERING CO.

CLEVELAND 17, OHIO

Canadian Division: Toronto, Ontario

Sales Offices and Distributors in principal cities

Duty Master A-c. Motors, Master Gearmotors, Reeves Drives, V•S Drives, Super 'T' D-c. Motors, Generators, Controls and Engineered Drive Systems.

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ELMIRA, N.Y.

MASTERS and PADS

FOR BETTER PERFORMANCE — BETTER PRODUCTION

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STYLE "S"
MASTER COLLETS and PADS
The Only Master Collet with
No Work Pressure On The Screw
Available For: Cleveland-Cone
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MASTER FEED FINGERS and PADS
Pads Cannot Work Loose
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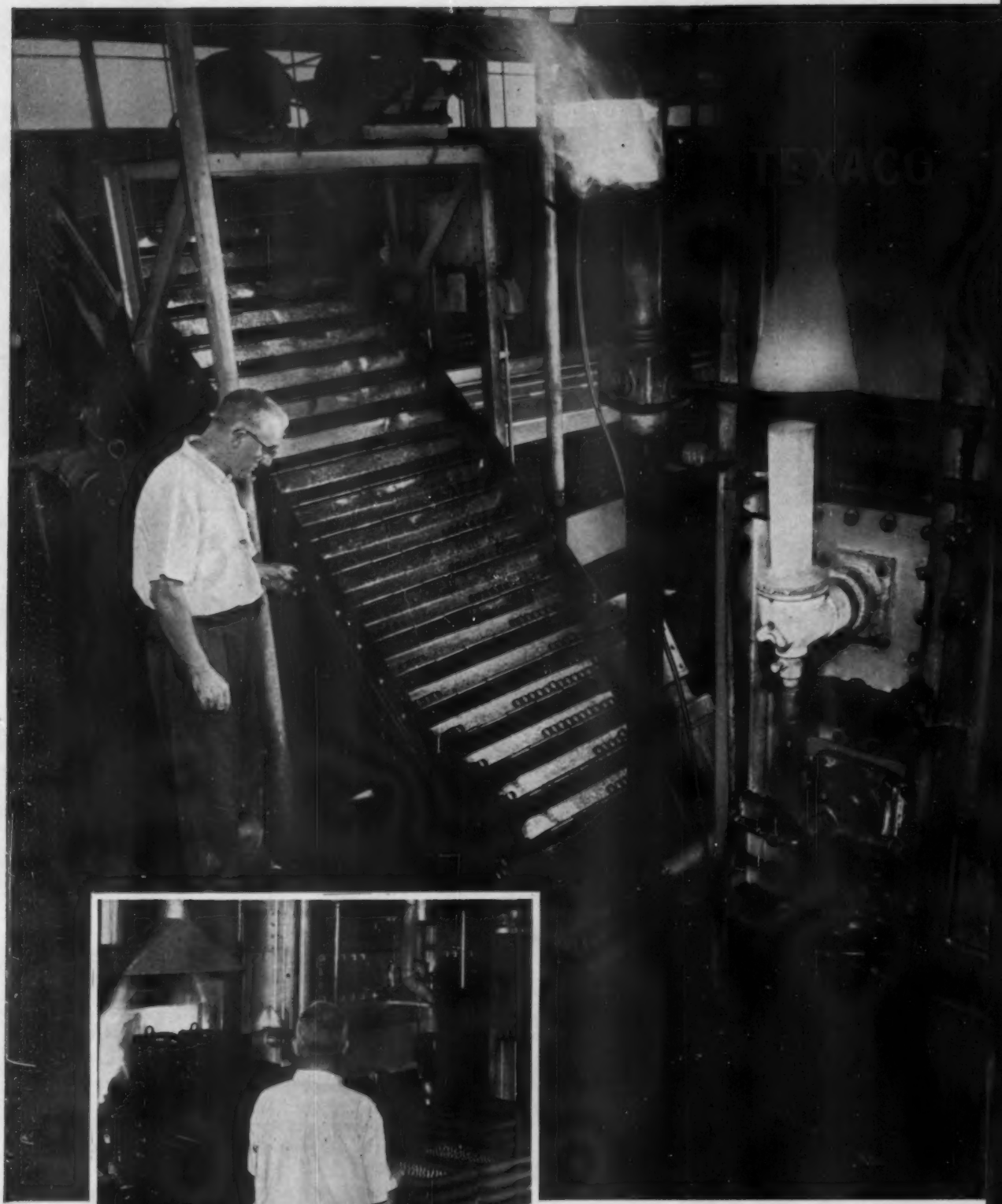
HARDINGE BROTHERS, INC., ELMIRA, N. Y.

◄ CIRCLE 207 READER SERVICE CARD

▲ CIRCLE 208 READER SERVICE CARD



Photos taken at Hoover Ball and Bearing Company, Ann Arbor, Mich., show (left) parts going into heat treat furnace and (above) coming out of Quenchtex bath.

QUENCHTEX OILS GIVE UNIFORM HARDENING IN THE PIECE

with improved grain structure... no darkening of metal...longer bath life...

The proper choice of a quenching oil depends on the analysis of the steel being used and the hardness desired, among other factors.

A properly chosen quench for any given steel should remove heat fast in the high temperature range, and at a lower rate as the temperature drops through the low ranges where the metal becomes brittle and subject to stress. Because steels vary widely in analysis, Texaco offers three separate QUENCHTEX OILS—each with a different cooling curve.

The differences in cooling rate between the three QUENCHTEX OILS are functions of their composition:

- **QUENCHTEX 500**—a conventional or straight mineral oil of low viscosity;
- **QUENCHTEX 510**—a medium-speed oil blended with special additives;
- **QUENCHTEX 520**—a high-speed oil blended from refined paraffin base crudes plus additives.

GET THESE PROVED ADVANTAGES WITH QUENCHTEX OILS

- Stability at recommended temperatures
- High resistance to evaporation loss and chemical change which occur on contact with hot metals
- Resistance to oxidation which causes contamination, oil and metal discoloration, uneven hardening
- Low drag-out and evaporatiou loss for longer oil life and greater economy
- **Compatibility with other quenching oils. You can begin using Quenchtex now—regardless of the oil now in your tanks.**

A Texaco Metalworking Specialist will be glad to take a sample of the oil you are now using for testing by Texaco's Research Laboratory. A cooling curve will be run on the sample and the compatible QUENCHTEX OIL will be recommended for make-up. For further information contact the nearest of the more than 2,300 Texaco Distributing Plants or write: Dept. AM-51.

☆ ☆ ☆

Texaco Inc., 135 East 42nd Street, New York 17, N. Y.

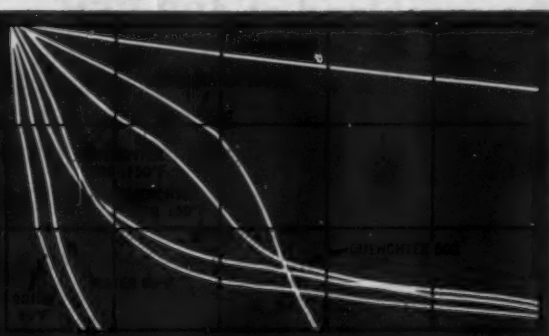


Chart shows cooling rates of several quenching media including QUENCHTEX 500, 510 and 520.

TEXACO MARQUENCH FOR HOT OIL QUENCHING

For products where full hardness combined with minimum distortion is required—gears, ball and roller bearings, bearing races, etc.—hot oil quenching with MARQUENCH can help reduce the number of rejects, increase product load capacities, and in some cases permit closer tolerances before quenching.

TEXACO

Throughout the United States

Canada • Latin America • West Africa

This mark tells you a product is made of modern, dependable Steel.

Note fine finish and clean-cut threads.

Want faster cutting speed?

USS Free-Machining Steels can be machined at 400 SFM

United States Steel makes *all types* of free-machining steels—USS Leaded and the well-known MX Steel in open-hearth or Bessemer. While most screw machine setups are run at speeds under 300 SFM, there are some jobs where the full potential of a 300 to 400 SFM machining rate can be realized.

Both MX and USS Leaded Steels can be machined at these high rates. The question then becomes one of obtaining the most practical and economical balance of cutting speeds, tool life, steel costs and machine maintenance.

Since each job is different, our specialists can help you choose the best steel for your application . . . the one that will give the highest production rate consistent with good machining and fine finish.

In any case, remember this . . . at United States Steel, good steelmaking practices are the rule. Careful control of chemical balance, rolling and finishing practices, and adherence to close metallurgical inspection standards are combined to produce the same high-quality bar stock time after time.

USS Free-Machining Steels are produced in all the popular screw-stock sizes as well as many other sizes. Whatever your requirements, specify USS Free-Machining Steels from your cold drawer. For more information, call our nearest district sales office or write United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

USS and MX are registered trademarks

United States Steel Corporation – Pittsburgh
Columbia-Geneva Steel – San Francisco
Tennessee Coal & Iron – Fairfield, Alabama
United States Steel Supply – Steel Service Centers
United States Steel Export Company
United States Steel

let's talk CAPACITY

FOR A SINGLE MACHINE OR A COMPLETE LINE

CAPACITY, what does this represent in terms of dollars to a prospective buyer of metal cutting machines.

We at **MICHIGAN** feel that manufacturing **CAPACITY** is an important asset and most beneficial time saving aid available. We constantly strive to improve our manufacturing and assembly methods, this in turn increases our **CAPACITY.** The ability to manufacture machines in less time, results in a low product cost to the customer.

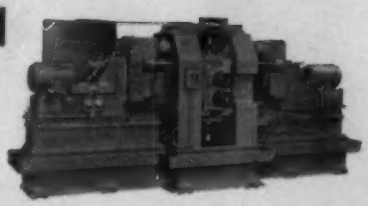
- Modern Building.
- Excellent plant facilities.
- Complete engineering.
- National sales staff.
- Blueprint and duplicating departments.
- Manufacturing facilities to machine every detail in all of our many components.
- **MICHIGAN** designs and fabricates electrical, hydraulic and lubrication installations.

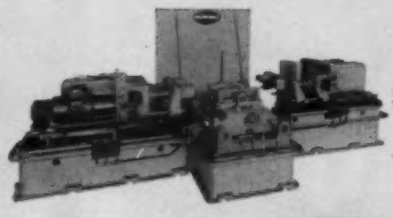
All this represents **CAPACITY.**

MICHIGAN'S CAPACITY pays off in savings to our customers. If you're looking for a special metal cutting machine of any kind, remember **MICHIGAN**—we specialize in dependable delivery, low product cost and excellent service. Send us your inquiries, we will be pleased to serve you promptly.

DIAL

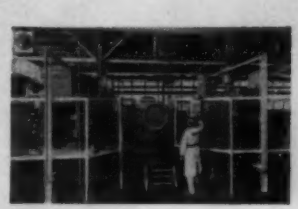
TRUNNION

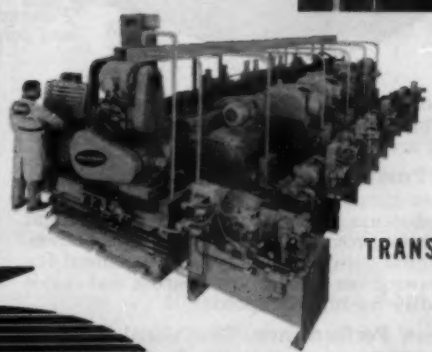




SHUTTLE

SPECIAL





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DRILLING
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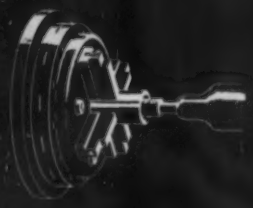
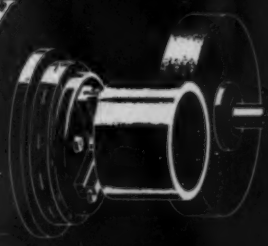
New ERICKSON
Air Operated or Manual
DIAPHRAGM CHUCKS
for utmost accuracy and concentricity





- *greater jaw rigidity*
- *internal or external chucking*
- *easy diaphragm replacement*
- *eliminates air leakage*

**Patented and patents pending.*

Basic design of new Erickson Air Operated Diaphragm Chucks* offers distinct advantages in three important areas:

Higher Production Speeds. Reduction in weight over conventional designs means lower inertial forces. Reduction in overhang reduces centrifugal forces; cleats provide sufficient counterbalance. Conventional compression-type adjustment for locating jaws gives greater jaw bearing and maximum rigidity for highest speeds.

Precision Performance. Traditional Erickson precision design and construction for utmost accuracy and concentricity.

Lower Maintenance. Diaphragm construction, with hold-down screws located on flat outer edge of diaphragm, reduces stress concentration and eliminates need for clearance holes through diaphragm for mounting bolts. Design gives higher yield point for diaphragm longevity and easier replacement. O-ring seals eliminate air leakage. Sludge slots around periphery promote escape of grinding dust and other maintenance-causing particles. AA-6606

Write for your free copy of "Erickson Air Operated Diaphragm Chuck" today.

ERICKSON TOOL COMPANY

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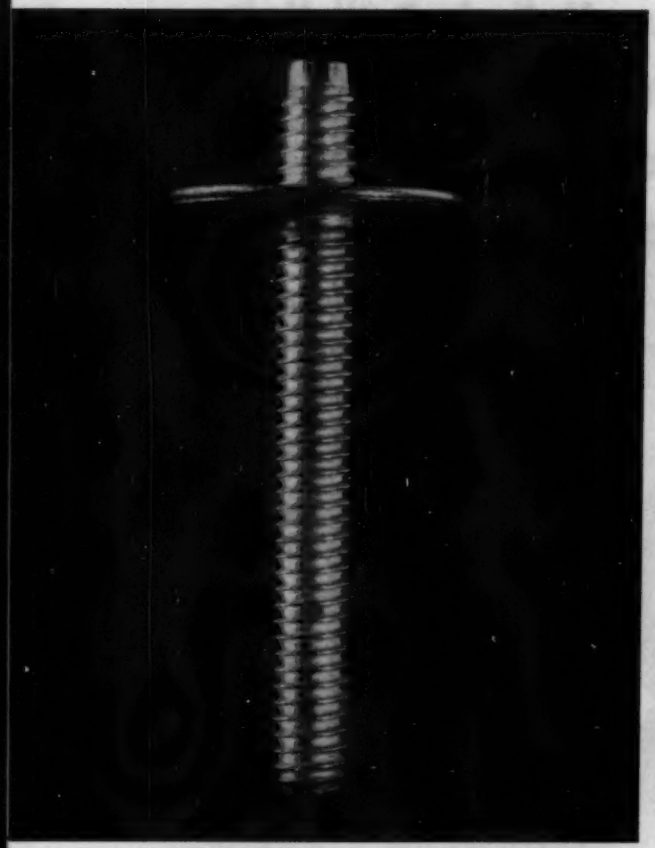
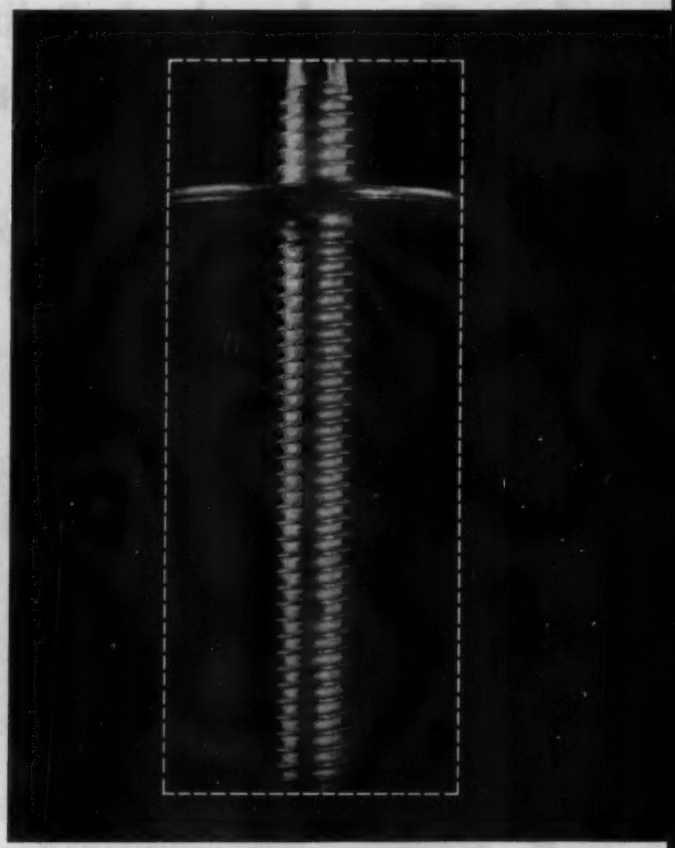
COLLET CHUCKS • EXPANDING MANDRELS • AIR-OPERATED CHUCKS • FLOATING HOLDERS • TAP CHUCKS
AUTOMATIC INDEXING • MASTER SPACERS • DIAPHRAGM CHUCKS • PUSH-ON ARBORS • QUICK-CHANGE HOLDERS
EXPANDING COLLETS • END-CLAMPING CHUCKS • AIR CYLINDERS (allowing stock to pass through)
EXPANDING JAW MANDRELS • SPECIAL HOLDING FIXTURES

This "impossible" screw is now being cold-headed



Now cold-headed from steel wire at one-tenth the cost.



Machined from bars, 91 pct of the steel is wasted.

This automobile window-adjusting channel screw is being produced from cold-heading wire at one-tenth the original cost. Formerly machined from bar stock with a 91 per cent waste, this special screw is upset to three-and-one-half times the diameter of its shaft.

Bethlehem Steel has played a vital role in the progress of cold-heading by supplying steel wire in the proper grades and analyses, and by recommending the correct heat-treatment.

You may now be machining parts that can be cold-headed, at less cost—and with improved properties. By no means do we say that we can supply cold-heading wire for every one of them. But our experienced metallurgists have helped many users of cold-heading wire to improve their results. Perhaps they can do the same for you. Our nearest sales office will welcome the chance to talk it over. Or get in touch with us at Bethlehem, Pa.

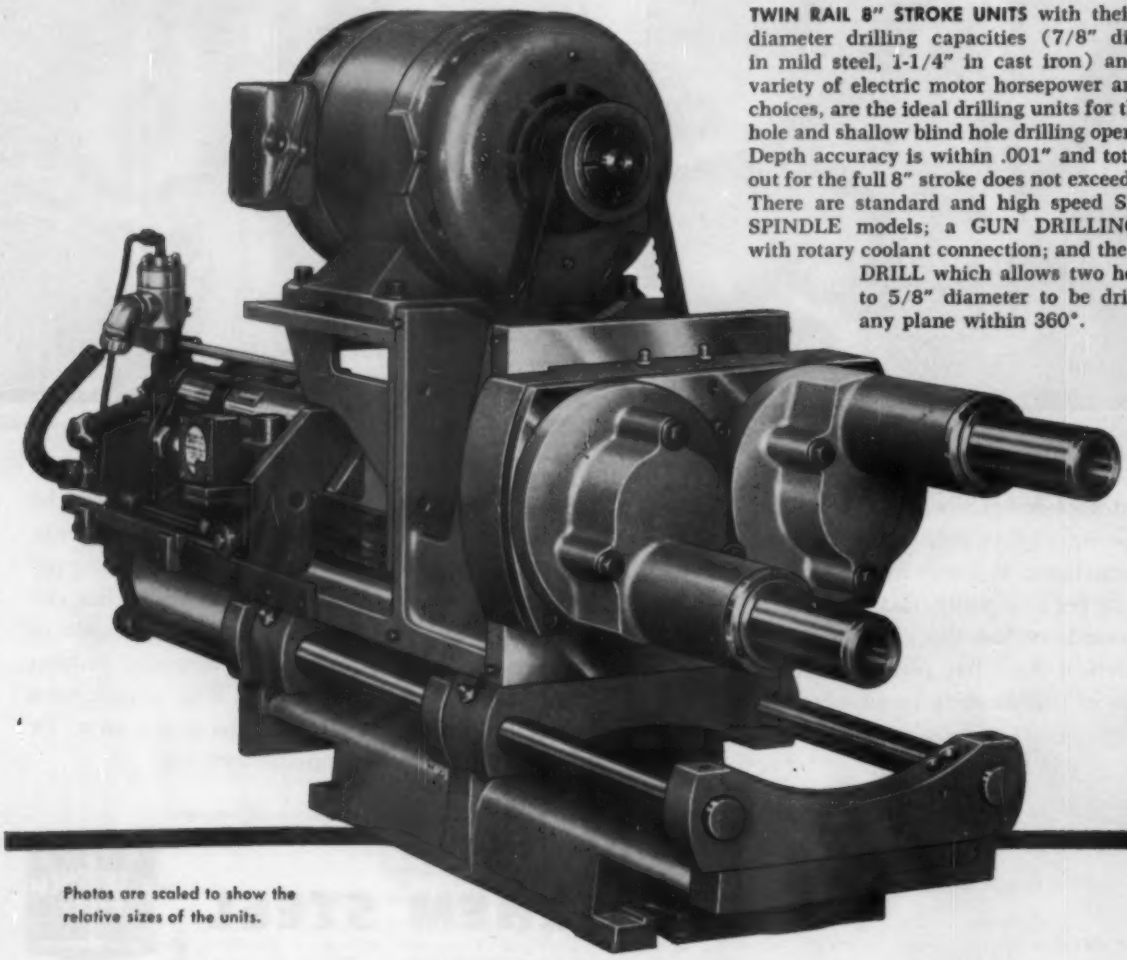
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

FOUR SOLUTIONS TO LOWER

These four basic Bellows-Valvair Drill Units, all air-powered, hydraulically controlled, electrically actuated, can make nearly any drilling operation more productive, less costly



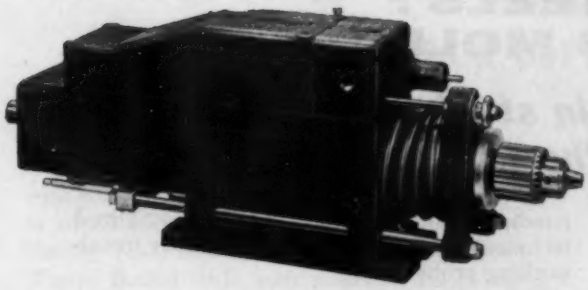
TWIN RAIL 8" STROKE UNITS with their large diameter drilling capacities (7/8" diameter in mild steel, 1-1/4" in cast iron) and wide variety of electric motor horsepower and rpm choices, are the ideal drilling units for through hole and shallow blind hole drilling operations. Depth accuracy is within .001" and total run-out for the full 8" stroke does not exceed .002". There are standard and high speed SINGLE SPINDLE models; a GUN DRILLING unit with rotary coolant connection; and the TWIN DRILL which allows two holes up to 5/8" diameter to be drilled in any plane within 360°.

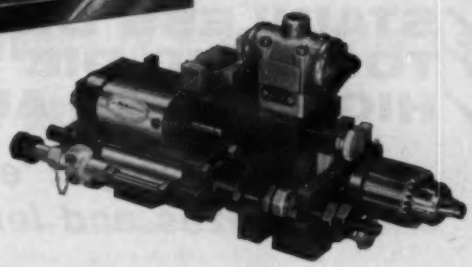
Photos are scaled to show the relative sizes of the units.

COSTS IN

DRILLING • TAPPING
BORING • REAMING
SPOT-FACING
COUNTER-BORING

"CARBI-DRILL" PRECISION BORING UNIT has so perfect an alignment that total runout of spindle to the machined base surface will not exceed .001" T.I.R. in the unit's full 4" stroke. Its drilling capacity is up to 5/8" diameter in mild steel, boring capacity is 1-1/2" to 4" diameter, dependent upon the material. Spindle speeds range from 609 to 6275 rpm (electric motor sizes from 3/4 to 2 hp). Power thrust at the quill is equal to 10 times applied air line pressure.





BELLOWS-LOCKE DRILLING and TAPPING UNITS are high speed drilling machines with a 3" stroke, drill capacity ranges from a No. 80 to 5/16" diameter. Rate of feed and speed of advance and retract are fully controllable. Units are available for pulley drive (as in photo), motor mounted parallel, and motor mounted "inline."

MODEL 22A DRILL HEAD has special advantages in close-quarter applications. The Hydro-Check (optional) provides a precision feed rate for the 2" stroke. Drill capacity is 3/16" diameter in mild steel. It can be mounted singly or in groups for synchronous operation . . . a versatile unit for drilling operations in wood, plastics, rubber, and light-gauge metals.

871C

Bellows-Valvair
AKRON 9, OHIO
DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)

Bellows-Valvair, Division of IBEC, Akron 9, Ohio

Please send me full details on Bellows-Valvair Drill Units

Name_____

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✓STAINLESS BAR AND WIRE?
✓TOOL AND DIE STEELS?
✓HIGH SPEED AND MOLD STEELS?

We've got 'em in stock . . . in shapes, sizes and lengths to meet your needs

Order specialty steels from your local Universal-Cyclops Specialty Steel Service Center and gain these cost-reducing advantages:

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A leading producer of specialty steels for over 75 years, Universal-Cyclops continues to supply you with highest quality steels, expanded services and stocks, and specialized technical assistance to help solve your metalworking problems.

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HOW MUCH COULD YOUR SHOP PRODUCE *IN A TWO HOUR DAY...*

...*LESS* A COFFEE BREAK?

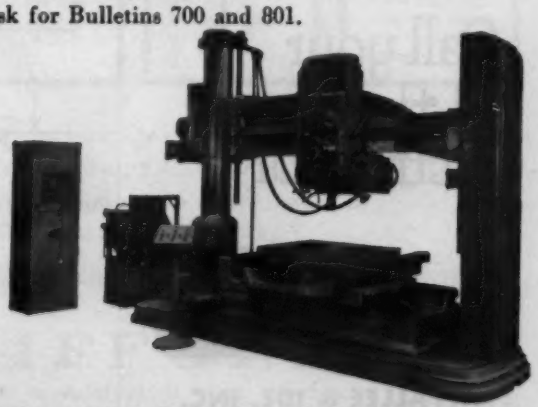
Almost as much as you now produce in 8 hours with conventional equipment! When you switch to an AMERICAN numerically controlled Positioning Table and the new AMERICAN Hole Wizard Radial Drill, your production will step up 400%!

In addition to fast, error-proof positioning to ± .000250", the AMERICAN positioning table gives you extreme ease of operation. The simply loaded punched tape is read by low pressure air, and automatically moves the table to first position at the touch of a button. After that, your operator need only touch the "Next Position" button on the portable console.

This rugged, profit-making combination was designed by American Tool Works and Sperry Gyroscope engineers to increase your production, eliminate expensive jigs, prevent operator error.

Ask your American Distributor about "Toolease," our leasing plan under which this AMERICAN Positioning Table and AMERICAN Hole Wizard Radial combination can improve your production... while it pays for itself. Or, write Section 163 at the address below.

Ask for Bulletins 700 and 801.



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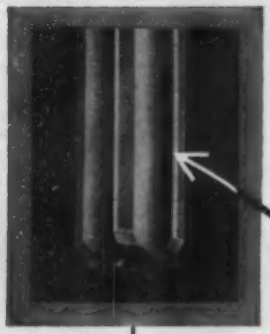
CIRCLE 218 READER SERVICE CARD



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LETTERS

to the editors

330 W 42nd St, New York 36, NY

Sine Bar Needs Correction

Dear Sirs:
In your "Practical Ideas" column you published an item from J H Sperman on a sine bar for angular grinding (*AM/MM*—July 11 '60, p147). This idea appears to be geometrically incorrect.

My calculations indicate that at an actual setting of 30° only 4.933 in. of space would be required instead of the 5.000 in. that Mr Sperman's sine tables would give him. This error would certainly make this type of angle setting suitable for only the roughest of purposes.

May I suggest that you check my statements, and if found to be correct, call this to the attention of Mr Sperman and your readers.

Frank B Homan
Palmer Physical Laboratory
Princeton University
Princeton, NJ

Dear Sirs:
. . . When I first read the article, I didn't believe it theoretically possible. . . . I finally worked it out with one example to satisfy my curiosity.

The example: to get an angle of 45° on a standard 10-in. sine bar, you need a build-up of 7.0711 in. with gage blocks. But on the idea submitted, you would need 6.9246 in. for the same angle.

Now, since this tool does not conform to sine functions for this one example, it cannot conform to any sine function. . . .

Leonard C Norman
Buffalo, NY

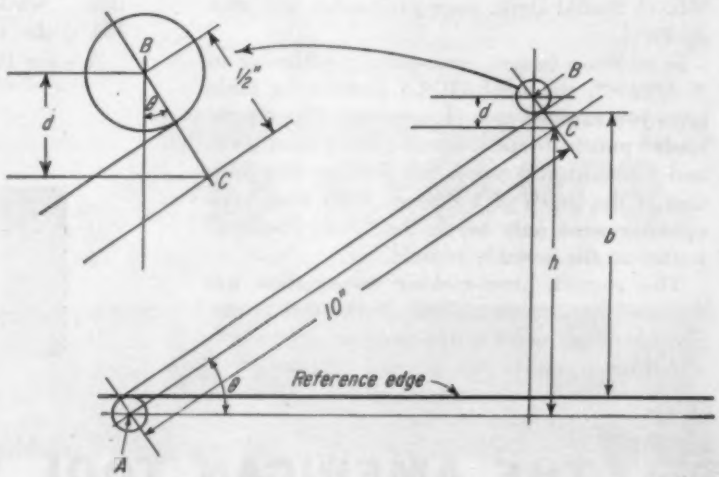
Readers Homan and Norman are correct. We've checked it ourselves, and we've cross-checked it with Mr Sperman. Through an oversight, he did not include the correction factor for the half-inch offset on his sine bar.

At very small angles the error is hardly noticeable, but it becomes more important as the angle increases, as follows:

Angle	Correction (subtract)
5°	0.002
10°	0.008
15°	0.017
20°	0.030
25°	0.047
30°	0.067
35°	0.090
40°	0.117
45°	0.146

The fault lies in the fact that the measuring points on this sine bar do not remain 10 in. apart as they would on a sine bar whose pins are not offset. At 90° the distance between the reference edge and the gaging point of the other pin would be only 9.5 in.

Therefore, as the hypotenuse becomes shorter, we must make



No other tracer attachment has all these features

Traces from any template (round, flat, wood, metal) or standard product.

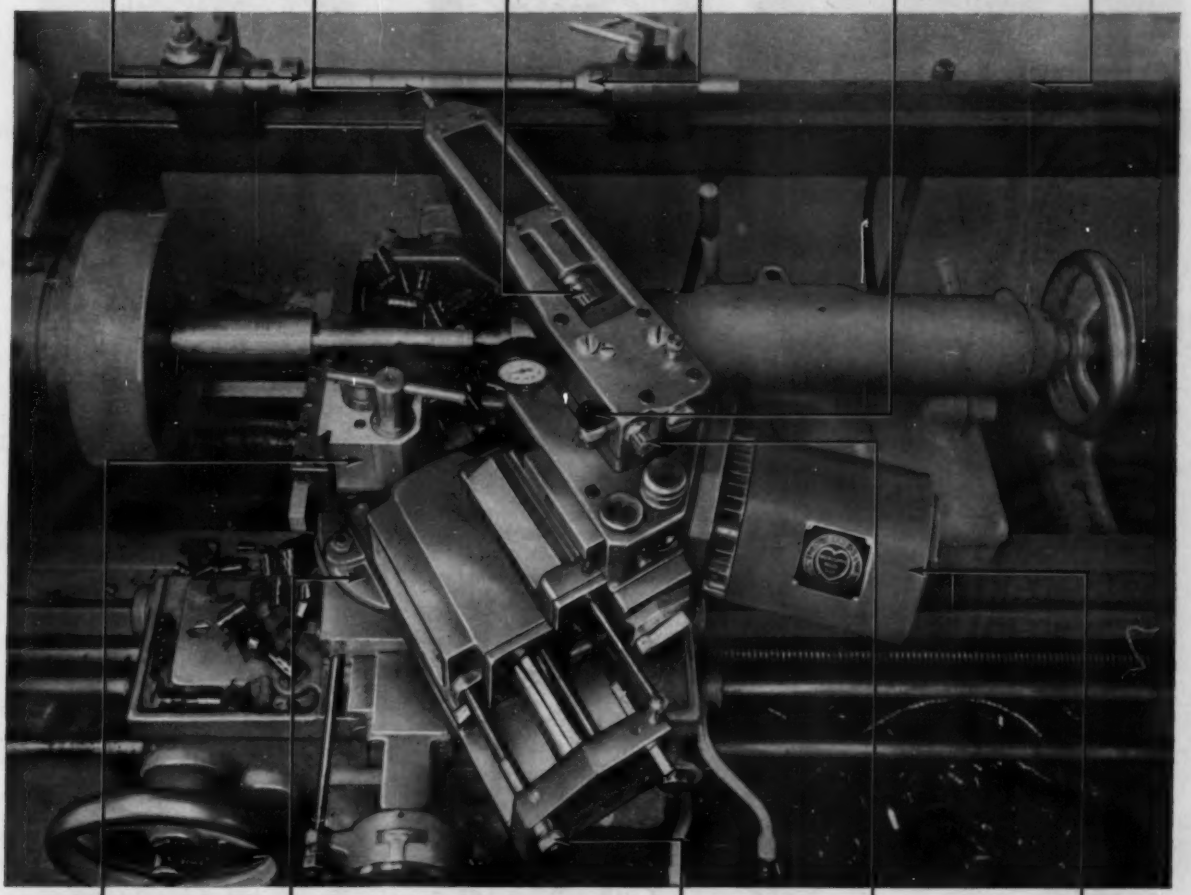
Tracer controls tool in continuous path for smooth, accurate finish.

Micrometer adjusts for cutting over, under or exact size.

Adjustable eccentric on template protects lathe tailstock.

Easy-to-reach control knob initiates or interrupts cycle.

Template rails furnished any length and with brackets to fit any lathe.



Tool post and holders designed for quick change of pre-set tools.

Complete swiveling for turning, boring or internal cutting at any angle.

Does not limit utility of lathe . . . regular turning can be done with tracer installed.

Positive stop locks unit for non-tracing cuts.

Adjustable valve controls feed rate for non-tracing work.

Close-coupled motor and pump eliminates hoses, assures sensitive control.

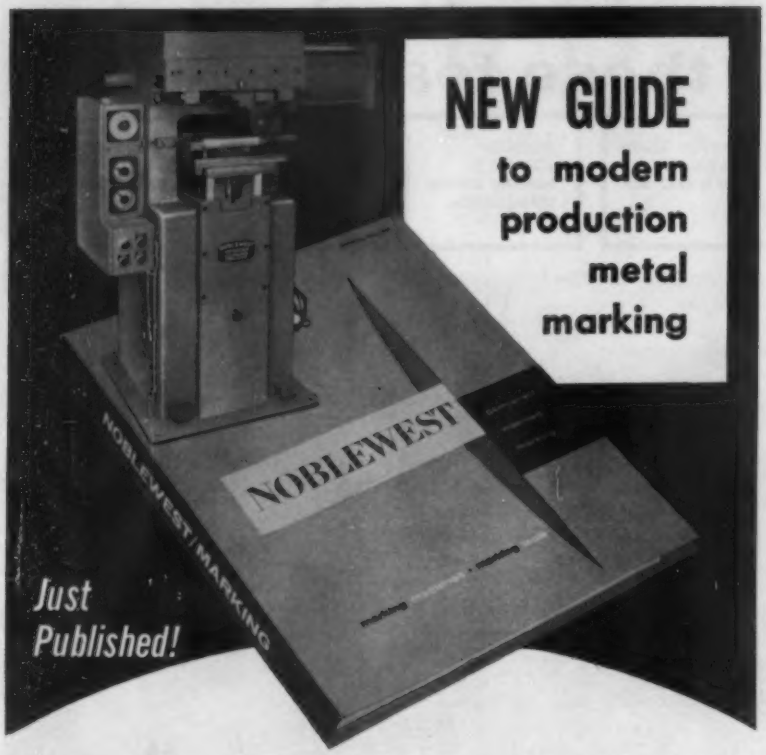
For far less than you would imagine, you can quickly convert any good lathe for turning multiple diameter shafts or for turning, facing and boring contoured workpieces . . . single pieces or high production. Three sizes to fit any lathe up to 27½" swing and up to 30 horsepower.

Write for complete information.

LELAND-GIFFORD

WORCESTER 1, MASSACHUSETTS

HYDRAULIC LATHE TRACER ATTACHMENT



TO mark what you make . . . to mark it well . . . to mark it *permanently* is essential to modern manufacturing and marketing. To *mark it best with Noblewest* has become a tradition with leaders throughout the industry, for Noblewest marking is *permanently indented* marking . . . and Noblewest equipment marks faster, better, at lower cost.

The basic types of Noblewest marking equipment are illustrated below. Our new catalog is a most comprehensive guide to the selection of marking machines and marking tools. For a copy write Noble & Westbrook Manufacturing Company, 17 Westbrook Street, East Hartford 8, Conn.

MARK IT BEST WITH NOBLEWEST IMPROVED MARKING DEVICES

NOBLEWEST

ORIGINATORS OF THE ROLL MARKING PROCESS

MARKING
NUMBERING
EMBOSSING
GRADUATING

a corresponding reduction in the gage-block height. To be precise, we must subtract $\frac{1}{2}(1-\cos\theta)$ from the usual sine-bar values.

In the diagram on p 70, we need the value for "b", but the sine tables give us the value for "h". From this value we can calculate "b" by subtracting the radius of pin A (¼ in.) and adding the distance d – ¼.

Thus, $b = h - \frac{1}{4} + d - \frac{1}{4}$.

Now, $h = 10\sin\theta$,

and $d = \frac{1}{2}\cos\theta$.

Therefore:

$b = 10\sin\theta + \frac{1}{2}\cos\theta - \frac{1}{2}$,

Or $b = 10\sin\theta - \frac{1}{2}(1 - \cos\theta)$

In other words, Mr Sperman's sine bar is not exactly a sine bar, but it does work if you subtract $\frac{1}{2}(1 - \cos\theta)$ from the value derived from the sine tables.—Ed.

Platers' Headaches

Dear Sirs:

In your "Metalworking Report" section (*AM/MM*—July 25 '60, p3) there was an item on "Plata-Seltzer," a foam used in plating tanks. The item said the material is made by Udylite Corp.

Would greatly appreciate your sending me more information on this development, such as "who?" and "where?"

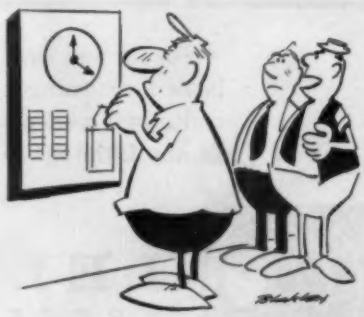
Stanley A Horab
Endwell, NY

Dear Sirs:

Where can I learn more about the tablets that put a foam covering on plating tanks?

J R Wilson
Chicago, Ill

The foam is produced by an effervescent tablet called Zero Mist. You can secure complete information on this product by writing to Robert Trees, Udylite Corp, 1651 East Grand Blvd, Detroit 11, Mich —Ed.



"In eight months it's the only machine he's learned how to operate."

CALENDAR

Pressed Metal Institute—Annual Meeting, Oct 10-14, Shawnee Inn, Shawnee on Delaware, Pa.

Society of Automotive Engineers—National Aeronautic Meeting and Display, Oct 10-14, The Ambassador, Los Angeles, Calif.

Industrial Management Society—Industrial Engineering and Management Clinic, Oct 13-14, Conrad Hilton Hotel, Chicago.

National Safety Council—National Safety Congress, Oct 17-21, Conrad Hilton Hotel, Chicago.

Magnesium Association—Annual Convention, Oct 17-18, Hotel Carter, Cleveland, Ohio.

American Society for Metals—National Metal Exposition and Congress, Oct 17-21, Trade and Convention Center, Philadelphia, Pa.

National Tool & Die Manufacturers Association — Annual Convention, Oct 19-23, Leamington Hotel, Minneapolis, Minn.

American Gear Manufacturers Association — Semi-annual Meeting, Oct 24-26, Edgewater Beach Hotel, Chicago, Ill.

Material Handling Institute—Central States Show, Nov 8-10, Kentucky Fair and Exposition Center, Louisville, Ky.

American Society of Tool & Manufacturing Engineers—Western Tool Show and Convention, Nov 14-18, Sports Arena, Los Angeles, Calif.

American Society of Mechanical Engineers — Winter Annual Meeting, Nov 27-Dec 2, Statler Hilton Hotel, New York, NY.

Society of Automotive Engineers—International Congress and Exposition, Jan 9-13, Cobo Hall, Detroit, Mich.

Instrument Society of America—Instrument-Automation Conference & Exhibit, Jan 16-19, Sheraton - Jefferson Hotel and Kiel Auditorium, St Louis, Mo.

Society of the Plastics Industry—Reinforced Plastics Div Conference, Feb 7-9, Edgewater Beach Hotel, Chicago, Ill.

NEW Involute Rolling Machine

with 3 Cylindrical Dies

- **for producing splines faster with greater accuracy**
- **for gear tooth finishing**

The new Reed A-425 heavy duty machine was specially designed for rolling involute splines and serrations and for gear tooth finishing.

The precise tracking of the three self-feeding independently adjusted dies produces accurate involute forms. It gives greater tooth strength and better surface finish. The machine may be automated or equipped with a semi-automatic loading fixture.

For complete information write for Bulletin A-424-1.

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Specialists in Thread and Form Rolling Tools and Equipment

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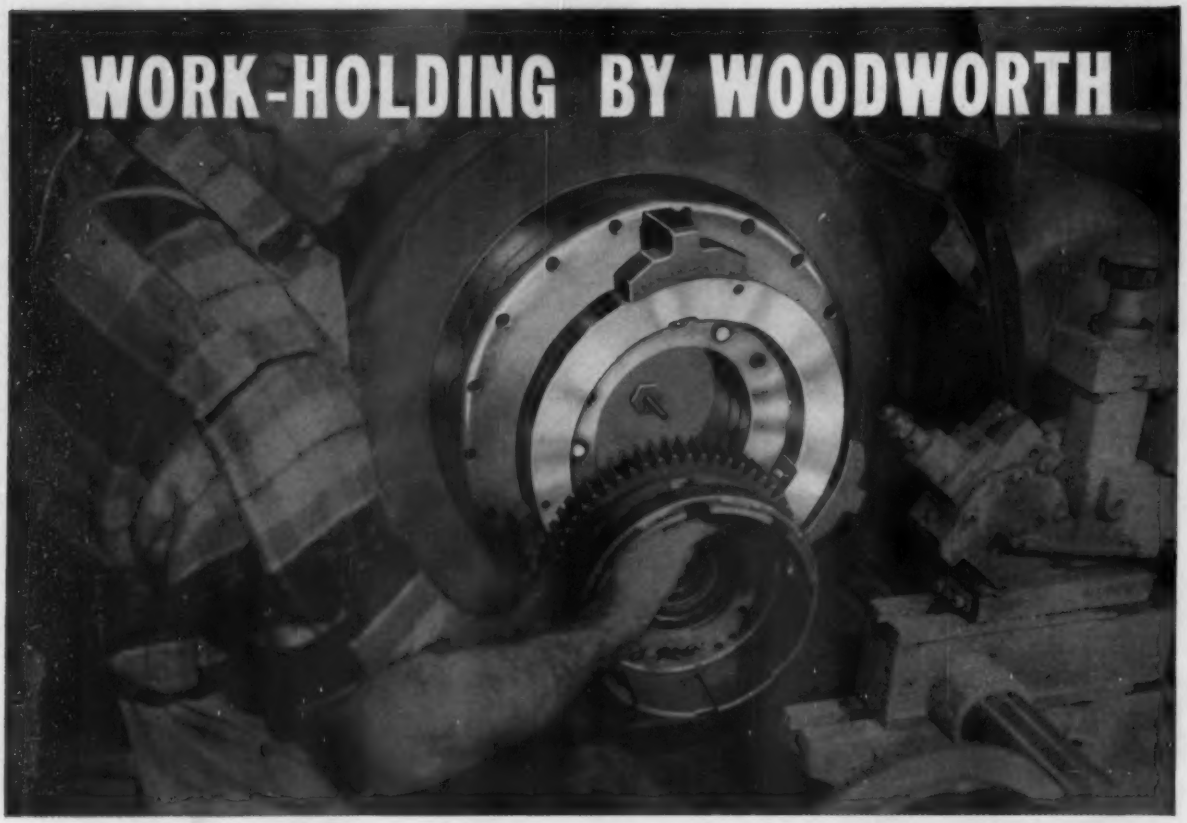
WORK-HOLDING BY WOODWORTH



ROCKFORD CLUTCH MACHINES 76 DIFFERENT GEARS WITH ONLY 2 WOODWORTH CHUCKS

W. F. CAREY

● **W. F. CAREY,** *Plant 2 Superintendent, Rockford Clutch Division of Borg-Warner Corporation in Rockford, Illinois, reported on the adaptability of N. A. WOODWORTH COMPANY'S DIAPHRAGM CHUCKS: "We were faced with deciding upon a method of tooling a large variety of small lot parts requiring accurate location for the grinding operation on a Heald #272 Internal Grinder.*

"The method finally decided upon, which we felt would be the most economical, yet provide flexibility for this variety of parts and maintain the accurate locational requirements were two WOODWORTH DIAPHRAGM CHUCKS. By using these two chucks and easily interchangeable adapters, 76 different parts are processed through this machine. The resulting flexibility, quick set up, and consistent quality of parts processed enable us to maintain top quality at a competitive price."

● One of the many set-ups at Rockford Clutch is shown above as the operator removes a gear and drum assembly from WOODWORTH'S 17" DIAPHRAGM CHUCK. Locating on the p.d. of gear teeth, .018 to .020 stock is removed in the grinding operation and a .0004 tolerance is maintained. WOODWORTH 17" 3-JAW and 13" 6-JAW DIAPHRAGM CHUCKS with interchangeable cages and pins are used in the machining of thousands of gears for Rockford hydraulic clutch assemblies.

WRITE FOR CHUCK CATALOG 3-58

When You Buy, Specify

ACCURACY YOU CAN TRUST

WOODWORTH

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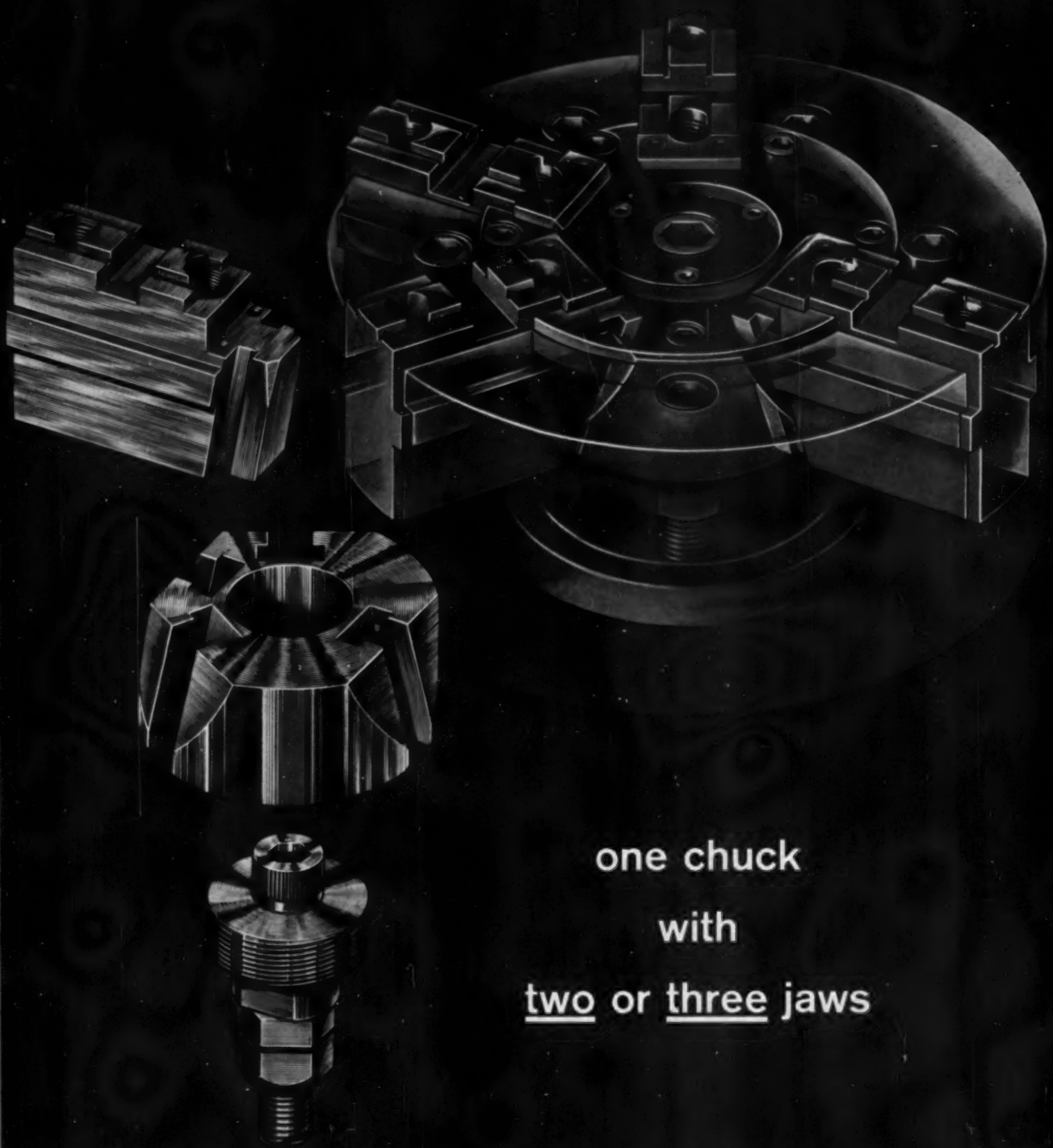


one chuck
with
two or three jaws

SKINNER DUAL PURPOSE POWER CHUCK

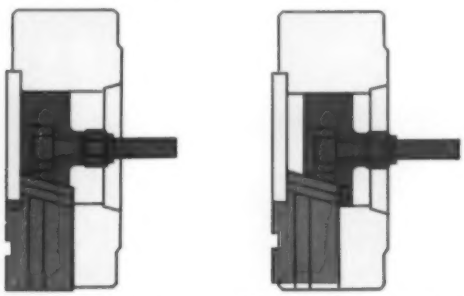
One Dual Purpose Power Chuck saves the cost of an additional chuck

Skinner dual purpose standard power chuck is designed with four master jaws so that it may be used as a two or three jaw chuck. It is no longer necessary to pay for one chuck to machine round work, and an additional chuck to machine odd shapes and castings. Not only do you save the cost of an additional chuck but you get all of the advantages of Skinner power chuck design listed below. Skinner dual purpose power chucks are available with adjustable, non-adjustable, or serrated jaws, in sizes 8″ to 36″.

A—Transparent view of dual purpose power chuck B—Master Jaw
C—Wedge D—Drawbar Stud and Wedge plug

Skinner wedge-type chuck offers these advantages

- Allows automation of long production runs.
- Reduces operator fatigue—air performs the muscle work.
- Adjustable gripping pressure—air pressure can be adjusted for light or heavy chucking—is not left to the judgment of the machine operator.
- Work can be gripped internally or externally.
- Assured continued high accuracy because of wedge design (see illustration).
- Reduced wear because of hardened parts—models available with flame hardened center hole and jaw locks.
- Complete line—heavy and light duty models in sizes from 4″ through 36″.

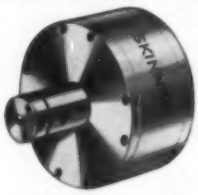


Wedge at top of stroke—jaws fully open (External gripping)

Wedge at bottom of stroke—jaws fully closed (External gripping)

The wedge and three jaws—only four moving parts—operate as a collet does with accuracy maintained over the whole range. The wedge angle is 14° which was found to be the most efficient angle for maximum power and jaw travel. With this wedge construction, the grip of a Skinner power chuck holds as set—even if the air line is broken—until opening power is applied in the opposite direction.

Skinner Power Chuck Accessories



Double-Acting Rotating Air Cylinders for use with power chucks and fixtures provide maximum pressure with a minimum amount of air. Cylinder walls are burnished to provide maximum sealing life. Cylinders in sizes 6 to 18 with semi-steel bodies are designed for low speed operation. Aluminum body cylinders in sizes 4 to 20 are designed for high speed operation.

Packaged Power Chucking Assemblies are available for Atlas, Cintilathe, Hardinge, Logan, Regal, Sheldon, South Bend, and many similar lathes. Assemblies are also available for Brown & Sharpe and similar automatic and hand screw machines to permit chucking of cold drawn parts, small or odd shapes and castings. Packaged assemblies consist of chuck with two or three jaws, threaded drawbar or drawtube, rotating air cylinder, cylinder adapter and necessary mounting for the individual machine.

Power Chuck Fixture, air or hydraulically operated, holds work for drilling and milling machines and for other bench and machine installations. Available in many jaw types in sizes 5″ to 36″.

A Complete Line of power chucking accessories includes hand, foot, and solenoid valves, drawbars, air units, and soft blank top jaws.

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SPOT NEWS...

- **Fuel cells as auxiliary space power sources** will be the subject of a new research program at Battelle Memorial Institute. At least 20 interested companies will collaborate in the program, helping to underwrite the study. Battelle, in turn, will supply technical facilities and personnel, conduct research, then pool results and proprietary rights with companies.

- **Crack-free nonferrous extrusions can be produced** by surrounding the metal with fluid under high pressure, reports National Engineering Laboratory, Glasgow, Scotland. This technique appears to increase the ability of the material to absorb stresses and so reduce the danger of surface cracking. So far, magnesium, beryllium, and bismuth have been tested successfully.

- **A rigid thermoplastic that can be cold formed** is now in commercial production. Called Lexan, it was developed about three years ago by GE's Chemical Materials Dept. It can be drawn cold in conventional presses with dies normally used for metals, and can be machined with little tendency to soften or gum.

- **The British machine tool industry will set up its own research body**, sponsored by the Machine Tool Trades Association. Companies supporting the new association have not been revealed, but reports are that major machine tool builders are not unanimously behind the plan.

- **Numerical control was very much in evidence** at the just-closed Hanover Machine Tool Exhibition in West Germany, whereas the concurrent Paris show (see p 100) had only one example. Shown at Hanover: a 3-station "machining center" which mills, drills, bores, reams and taps—built by Germany's Burkhardt & Weber and equipped with Hughes Aircraft Co controls (see p 3); a Burgmaster turret drill made by Hueller of Germany under license; a Kolb jig borer with an optical grating system; a Waldrich-Siegen roll-turning lathe with continuous path control; a Bohle profile miller equipped for 2-D control from Leitz optical synchros: and a Droop und Rein contour miller with EMI tape control.

- **Satisfactory joints can be made in titanium and its alloys** using silver-aluminum brazing alloys, reports the Royal Aircraft Establishment (England). The brazing alloys require no flux and can be applied at 1200 F in vacuum or argon. Tensile tests of T-shaped specimens show strengths of 1250-1550 lb per inch run of joint. The brazing alloy was 70% Al—30% Ag.

- **Technological advances on the Continent** will lead to substantially greater competition for the United States in such fields as machine tools, light engineering manufacturing, and electronics, says Geoffrey Browne, a leading British economist who recently completed a study on European economic integration.

- **A Mach 2 to 2.4 airplane is possible immediately**, according to scientists at Garrett Corp, but might become obsolete because its aluminum alloys would be stressed to their maximum heat tolerance and could not accept more powerful engines if they became available. But the stainless steel-titanium structure needed for a Mach 3 plane could take the greater heat of higher speeds.

- **GM's Australian subsidiary, General Motors-Holden Ltd, is putting $33,750,000** into an expansion program, another step in the target of 200,000 units made and assembled in Australia. Goal may be achieved by 1965-66. Expansion comes in the face of GM's first real competition in Australia—introduction of the Falcon.

NEW 1⅝" MODEL AB CLEVELAND

SETS UP FASTER THAN ANY OTHER SINGLE SPINDLE AUTOMATIC!

With its years-ahead features, the 1⅝" Model AB Cleveland sets new high standards for speed and convenience of set-up...cuts your costs on short-run work to record new lows!

Here is the only single spindle bar automatic where you can set 10 separate, infinitely variable spindle speeds (40 to 3100 rpm), and infinitely adjustable forward and return turret tool feeds, simply by turning knobs on the programming panel. There are no change gears or feed cams involved. The precise speeds and feeds selected will repeat accurately, cycle after cycle, until changed. All other controls are conveniently located and quickly set.

EXACT SPINDLE SPEEDS AND TURRET TOOL FEEDS ARE SET WITH A TWIST OF THE WRIST!

This programming panel on the 1⅝" Model AB Cleveland contains every control necessary for setting spindle speeds and turret feeds. You simply turn the appropriate knob—one for each of five turret positions, forward and return—until the speeds and feed rates desired are indicated by the pointers of the speed and feed monitor dials.

This Cleveland gives you the capabilities of a tape-controlled machine for profitable, automated small-lot production . . . **plus** the time-saving advantage of immediate, on-the-spot feed and speed adjustments for top efficiency on every cutting operation! Full details on this years-ahead Cleveland are illustrated and described in new Bulletin No. 560. Write for your copy, or call in a Cleveland field engineer for complete information.

Write for Bulletin No. 560. See this new Cleveland at Booth No. 900, The Machine Tool Exposition.

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WASHINGTON...

Optimism on business outlook . . .

The Eisenhower Administration's top economic policy makers still say the current signs of business softness do not represent an oncoming recession. To be sure, the year is not going the way they anticipated. They initially forecast corporate profits of $50 billion, for instance. The actual rate now looks as if it'll hit several billion below this.

Their view is this: Business is making a "rolling readjustment" that is disguising the robustness of broad statistical meaures such as GNP. They believe this is clearing the way for what could be a solid advance of business next year, instead of leading to the recession that so many private economists talk about.

If they feared a sharp decline—big enough to worry voters—they'd have reason to say so now, before the upcoming presidential election, and to begin taking anti-recession steps like increasing defense orders, pumping fresh money into federal construction, and such. They are not doing these things. Indeed, they're recommending against such measures.

Administration's views . . .

Eisenhower's advisers argue that the major factor keeping this year's economic activity below levels widely predicted last January is the new tight-inventory policies of private business. As they see it, business is adjusting to lower sales-to-inventory ratios. As long as consumption of finished goods remains strong, they say, there can be no real recession. It is argued, in fact, that business this year is laying the groundwork for a sound and healthy advance in the near future, into a period of "inflationless prosperity."

A leading advocate of this view, Treasury Secretary Anderson feels the fundamental factor in 1960 is that businessmen no longer fear inflation, and no longer are making either their inventory plans or their investment plans on the assumption that prices will always rise. Anderson believes that once the economy is geared to this new attitude, the economic statistics will once more reflect broad growth, this time without recurring price rises.

More defense funds released . . .

The Administration has jacked up defense contracting plans once again by allowing the Pentagon to spend another chunk of Congressionally approved military budget increases. The action does not have any deliberate anti-recession implications. It represents, instead, a reaction to political pressures to allow the Services to use some more of the funds tacked on to the defense appropriation for urgent projects.

The latest batch of approved funds totals some $136 million, and is earmarked mainly for procurement of "back-up" components for Lockheed's Samos reconnaissance satelliate and all-out development of the Navy's Polaris A-3 missile (the 2,500-mi version). Aerojet-General, the Polaris propulsion system contractor, and the project's propellant suppliers, will get most of the extra funds.

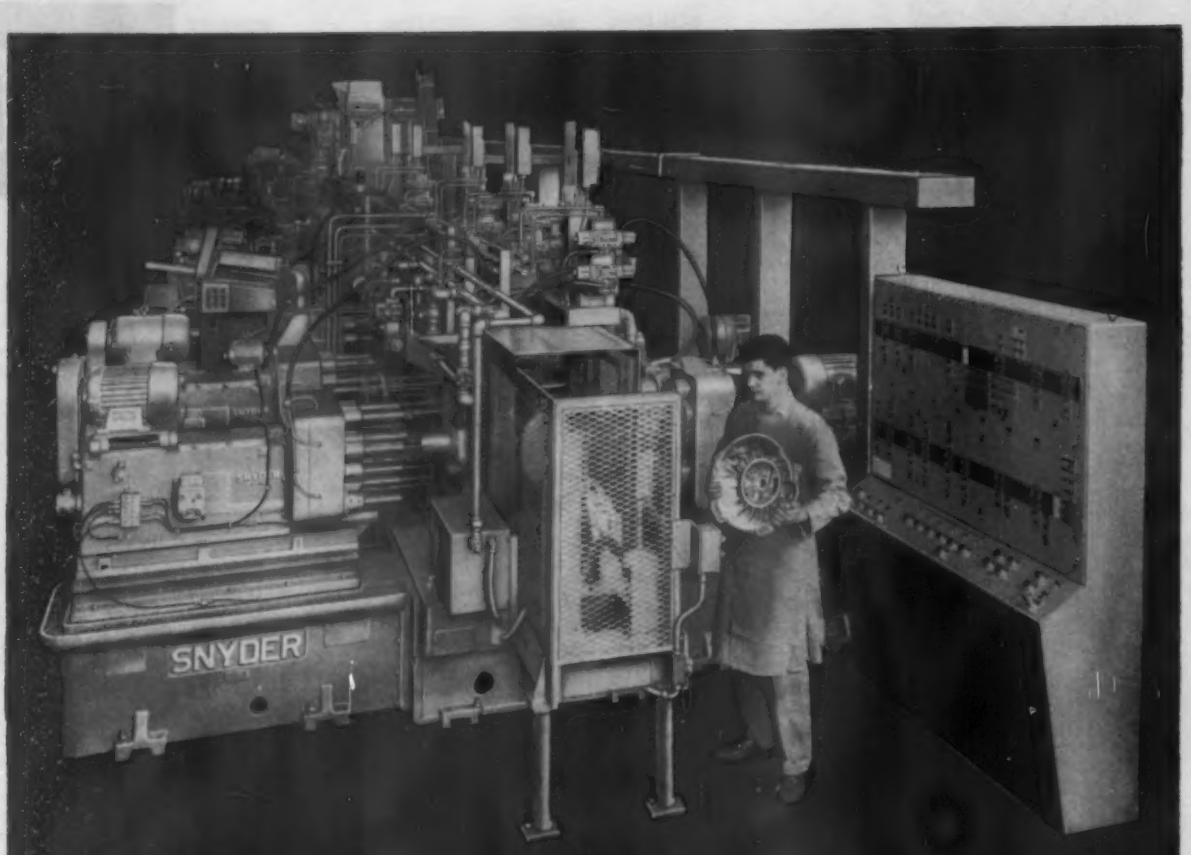
The Democrats have raised a fuss over the Administration's reluctance to go along with Congressionally approved increases for specific arms projects. This latest release of funds leaves well under $500 million of the extra appropriations still tied up. But the outlook is for additional releases shortly. The Army, for example, will shortly get $25 million to buy M-113 aluminum-armored personnel carriers.

"Value engineering" contracts . . .

Watch for a growing volume of Air Force and Navy contracts with so-called "value engineering" clauses. Contractors will be encouraged to set up special engineering staffs to "analyze or appraise each element of design, manufacture, procurement, and installation of an item of hardware to achieve the required function specifications at the lowest possible cost." Purpose is to get the "goldplating" out of military products. Incentive for contractors: a chance to share with the military procurement agencies savings generated by value engineering.

Navy's Bureau of Ships, which has used value engineering in shipbuilding for years, is now touting the concept in hardware procurement. The Bureau of Naval Weapons and Army Ordnance are following suit. The first Army ordnance production contract with a value engineering clause has gone to Temco Aircraft for Hawk missile components. The Air Force also plans to get into the act shortly.

BuShips allows contractors to keep 50% of savings resulting from value engineering. Policy of the other Services is not as clearcut. In any case, value engineering clauses offering financial incentives are considered most suitable for fixed-price hardware procurement covered by firm government specifications.



DIFFERENT SIZED PARTS INTERMIXED AT RANDOM ARE PROCESSED AUTOMATICALLY ON SNYDER SPECIAL 56-STATION TRANSFER

Here's another big Snyder special "building-block" transfer with a lot of work versatility.

Specifications called for one sequence of operations on a big aluminum transmission cover case for domestic use and a different sequence on a smaller cover for export.

Schedules set a production rate of about four dozen cases per shift, but for production convenience, the machine had to accept these parts intermixed at random and run them through automatically.

So, Snyder Engineering designed a "collar" which bolts to the smaller piece, bringing it up to locating and clamping dimensions of the larger piece. Limit on the collar and workpiece control appropriate switches which by-pass certain operations. Parts are automatically positioned in process.

Operations include drilling, reaming, boring, tapping, chamfering, spotfacing, center drilling, end milling, profile, air gaging, reaming to rectangular pins, grooving in bushing and a couple of washing operations.

Production is 240 parts an hour at 100% efficiency. Any of the 56 segments can easily be converted for compatible operations on other parts and the number of segments can be increased or reduced at any time. Your inquiries are invited.

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DETROIT...

The other cars...

With all the talk about compacts, the fact that Detroit still subsists in the main upon standard-size automobiles tends to be ignored. Here's a rundown of the new ones.

Buick...

LeSabre, Invicta and Electra models are continued for 1961 with major styling changes, but with nothing startlingly new mechanically. This division plans a production mix of 280,000 big cars and 160,000 specials.

Squared-off roofs and deeply crowned fenders mark the new style theme, which we hope proves more successful for Buick than it was for Ford in 1960.

The Midland-Ross-supplied chassis is entirely new and supports a Hotchkiss drive for the first time in recent memory. Much has been done to firm up ride and handling.

Parking lot attendants the country over will press in vain on the 1961 Buick gas pedal; the starter control has finally been moved up to the ignition switch.

Cadillac...

Even if you are not a fan of this make, your relatives will someday follow you to the cemetery in one. Whether next year or 20 years from now, it will be a finny procession. Cadillac says it started fins and intends to keep them.

The $15,000, Italian-made Eldorado Brougham has been dropped and so has the Seville hardtop. The line is now headed by a highly luxurious Sixty Special formal sedan. As on all GM cars, the windshield has been condensed somewhat to eliminate the dog leg in the "A" post.

A notable Cadillac first is factory lubrication of all suspension and steering bearings. These are sealed for the life of the car.

Chevrolet...

The world's largest selling automobile is sticking to a formula that seems proof against onslaught from both compacts and Ford. In essence, this is good engineering housed in somewhat garish sheetmetal and no less than 23 different engine-transmission combinations.

Sea gulls will no longer recognize mama as a Chevy drives past. The trunk is flattened out and opens at the bumper line. For the young-in-heart, there is a 335-horsepower, fuel-injected V-8 and a floor-mounted, four-speed transmission.

Oldsmobile...

This make has been slimmed by four inches and shortened by three. An all-time high of eight distinctively different roof lines are offered in the 18 different models.

A box frame replaces the X-members formerly used, and the new Hydramatic transmission has 25% fewer parts. Luggage space has been greatly increased by vertical positioning of the fuel tank.

Someone once asked the Oldsmobile people what "88" and "98" stood for. The answer, after exhaustive research, was: "Well, they are nice sounding numbers."

Pontiac...

Pontiac's straddle-wheeled Chiefs will continue to frighten garage doors across the country with their "wider than I really am" appearance.

There is a delectable assortment of optional powerpacks on a V-8 that has become the favorite of speed merchants the country over. Wheelbase has been shortened by two inches.

Ford and Mercury...

Big Ford news is lengthening of the chassis lubrication interval to once every 30,000 miles. Ford and Mercury share a common body shell for the first time since 1956, and the latter, for the first time, offers its version of the Ford six-cylinder engine.

As on all 1961 cars, a device that feeds crankcase fumes back into the carburetor is standard on units destined for California delivery.

Lincoln-Continental...

The new Continental is a good 15 inches shorter and four inches narrower than the current behemoth, yet interior room is unchanged. Styling has transformed it into a 4-door Thunderbird in both convertible and hardtop form. Bodies, built by Budd, are of unitized construction.

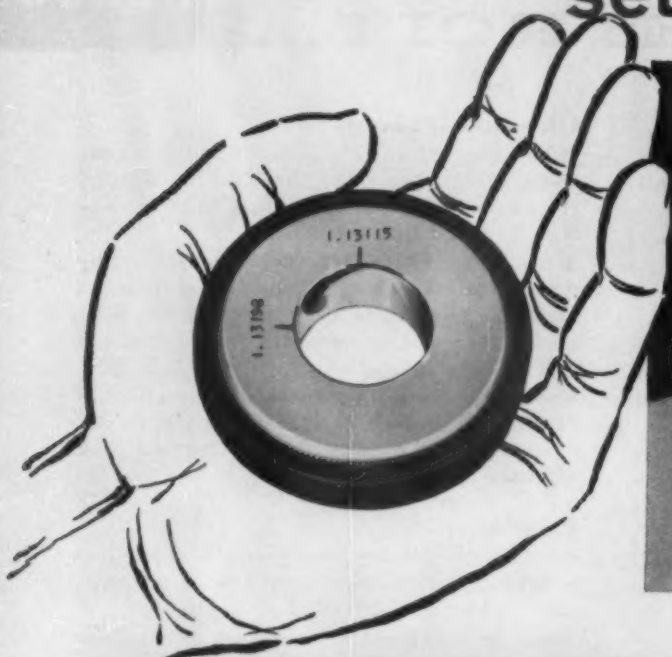
Chrysler...

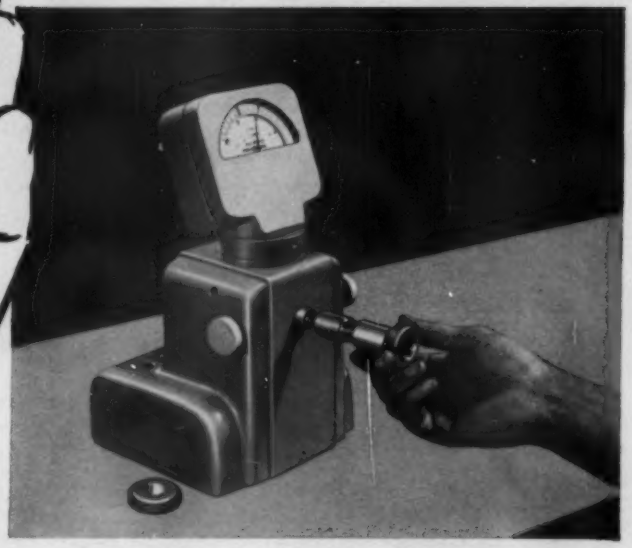
The 1961 Plymouth, Dodge, DeSoto, and Chrysler models, introduced in Florida last month to the accompaniment of hurricane Donna, were described in our September 19 issue, page 81.

A footnote...

Stylists of Chrysler's new Imperial are openly proud of their version of yesteryear's free-standing headlamps, but glower when asked if running boards are optional—**By Don McDonald**

NOW—Two dimensions in one setting ring gage!





A single Bryant 2-D Gage replaces two master setting ring gages, keeps air gages accurate!

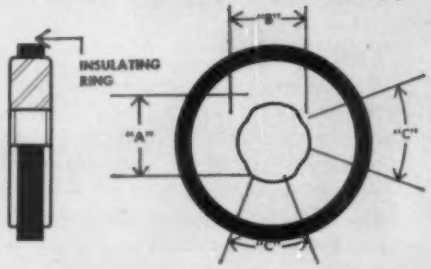
Check the advantages of the new Bryant 2-D Master Setting Ring Gage

- Fastest, easiest calibration method
- Detects any change in range
- Controls high or low indicator drift
- Checks pneumatic plug wear
- Cuts master ring inventory in half
- Fast delivery of standard or special sizes

The revolutionary Bryant 2-D Precision Master Setting Ring Gage combines maximum and minimum setting dimensions in one air gage calibrating ring! Measured and marked to Class X accuracy, 2-D Master Rings can be used to calibrate any spindle-type air gage. Standard sizes from .365" to 2.510" I.D.

Call today, or write direct for details.

TWO STEPS TO ACCURACY!



1. Slide 2-D Master Ring over pneumatic plug with either "A" (Maximum) or "B" (Minimum) diameter oriented over plug nozzle. Adjust dial indicator of gage to corresponding minimum or maximum limit on scale.

2. Rotate Bryant 2-D Master Ring to its second diameter. Repeat gage calibration at opposite end of scale.

Surface finish within 40° working areas "C" is 4 micro-inch (RMS) or better.

60-59

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MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING AND BORING SPINDLES • CUTTING TOOLS • DRILL JIG BUSHINGS • TORQUE ACTUATORS • CONTOUR PROJECTORS • GAGES AND GAGING EQUIPMENT • GRANITE SURFACE PLATES • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • ATOMIC ENERGY EQUIPMENT • RAILROAD PINS AND BUSHINGS • DAIRY AND OTHER PACKAGING EQUIPMENT

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Greenville Plant, 945 E. Sater St., Greenville, Ohio

AIRCRAFT and MISSILES...

TRENDS

Navy worries over politics . . .

Navy brass are worried about the two party platforms on military organization. Both mention the need for more unification of the Services. To the admirals, more unification spells downgrading the Navy's role. The Navy worries more about the Democrats, however, because of the influence of Senator Stuart Symington, former Air Force Secretary and long-time unification advocate, in the Kennedy camp.

The admirals are taking their fight against military unification to industry. Their pitch: Stronger unification would mean consolidated procurement, which in turn would mean channeling defense contracts to fewer numbers of suppliers. Their point is this: When each of the three Services buys an item, each can go out to as many as, say, ten companies. But if just one military agency were to handle contracting, odds are the numbers of suppliers would have to be substantially trimmed.

NASA's "standard" satellite . . .

The civilian space agency is designing a "standard" space satellite which could perform a wide variety of scientific experiments without the need to custom-make each vehicle for specific projects. Most of the fabrication work is being done "in-house" by the agency. The satellite is expected to be ready in another year or so. Key plan is to standardize all equipment required to get the satellite into orbit and to feed back information.

Payloads for the satellite will run up to a ton or so. NASA officials say the "standard" satellite will enable them to cut time and expense in space experiments, and allow them to conduct space probes almost on a production-line basis. The satellite has been tagged a "space bus." As scientists come up with required experiments, they will be pooled with other experiments carried in the satellite.

Satellite detection net . . .

The Pentagon is pushing plans to bolster the nation's satellite detection system. Right now, there are two sets of three stations each stretching across the US from San Diego, Calif, to Ft Stewart, Ga. Each set of stations has one radar transmitting station located between two receiving stations. The trio of stations covers a 500-mile linear area, but can only detect satellites with any degree of certainty under an altitude of 500 miles.

To plug the gap between existing stations, a new high-powered transmitter is slated for installation near Wichita Falls, Texas. It will be more powerful than existing transmitters at Gila River, Ariz, and Jordan Lake, Miss. But the military won't say how much farther out the new radar will be able to detect satellites. The other transmitters will likely be replaced with more powerful units soon, too.

Lighter walls for spacecraft . . .

Spacecraft built with multi-wall construction (layers of metal walls separated by air) can save more than 50% in weight and provide the same protection against meteoroids as single, solid walls, according the General Electric's Missile and Space Vehicle Department.

Aluminum, steel, and magnesium pellets, ranging in size from one-eighth and one-half inch, were fired against "bumper" shields made of aluminum, steel, and magnesium. These thick shields dissipated much of the energy of the simulated meteorite blasts, with the result that the vehicle's pressure hull was only mildly pitted.

Competition for missile business . . .

The missile industry is shaking down from glamorous growth to stable progress, according to W E Zisch, vice president and general manager of Aerojet-General.

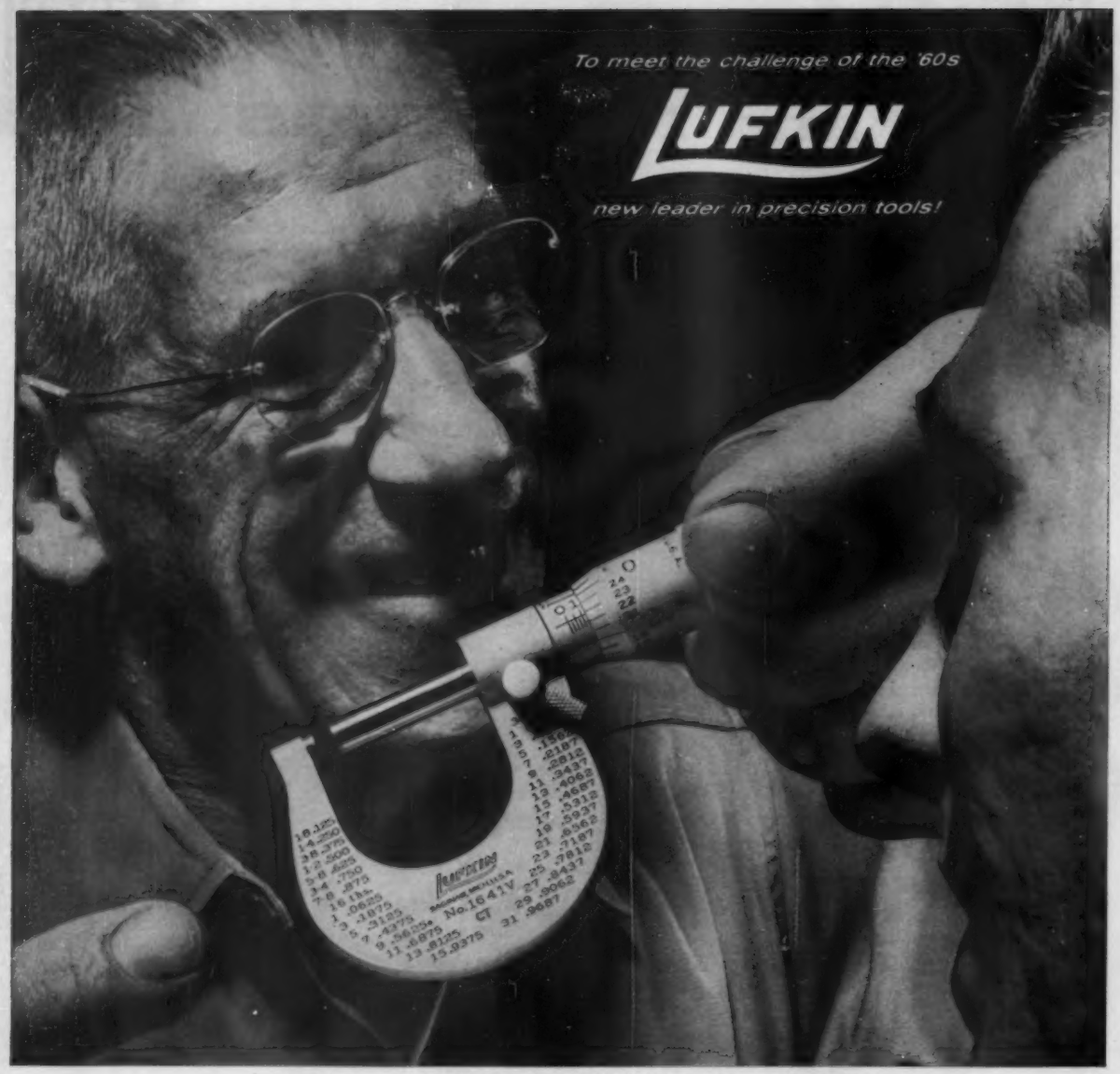
Aerojet, along with many other missile builders, notes that while business is still increasing, the rate of growth is slowing down considerably and profits are shrinking.

This reflects the closer competitive position into which all aerospace companies are moving, said Zisch. Cost sharing with the government on research and development contracts, required by any company that hopes to retain leadership in the field, is one major factor. The entry of many new companies into the field is another.

"Midgetman" under study . . .

The Air Force's Ballistic Missile Division will study the presentations submitted by about 18 companies on the small mobile ICBM generally referred to in the industry as the Midgetman.

Current planning calls for a missile about 30 feet long, weighing about 25,000 lb including control equipment and other gear. Total weight of the weapon system should come close to 50,000 lb.



"The fabulous '60s, with tremendous technological advances predicted, will require this type of perfectionist precision tool . . . and, son—

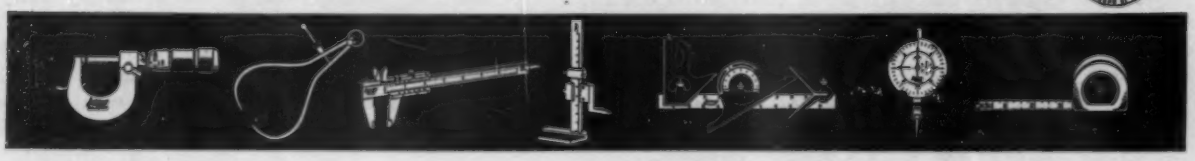
Lufkin micrometers have 5 to 7 fewer parts."

That means fewer parts to get out of adjustment. And the one-piece frame and hub simplifies wear adjustment. Gives you greater accuracy, longer!

From the tips of the long-wearing tungsten-carbide faces of the spindle and anvil, to the ratchet stop top, this Lufkin micrometer is superior in every way. **The exclusive cam lock locks setting** at a flick of the thumb . . . prevents costly reading errors.

Notice how those big numbers and wide-spaced graduations stand out against the soft, nonglare Chrome Clad® finish? Makes reading fast and accurate. And you can take measurements in places inaccessible to many other micrometers!

See your industrial distributor. He knows precision tools and can show you how Lufkin leads in design and craftsmanship. His stock is maintained to fit your needs. See him for prompt and reliable service. LUFKIN, Saginaw, Mich.



MACHINE TOOLS...

Hanover: trend to national shows?

The spirit of international cooperation between the machine tool makers of western Europe seems to be wearing a little thin.

This year, for instance, the French machine tool show at Paris and the German show at Hanover have just finished concurrent runs, and the Italian show is coming up within a few weeks.

From this, it is evident that a pattern of biennial national shows is now firmly established on the Continent—even the Swiss devote a section of their Basle Fair to machine tools.

The reasons for the trend to national rather than international exhibitions are several, but the most important is that the international shows were becoming so big that many countries felt their exhibitions were lost in the shuffle.

Before the war, there were only about 600 machine tool companies in all of Europe, including Russia. Today, there are around 1500 in western Europe alone, 500 of them in West Germany.

The national exhibitions, in contrast to the international ones, are aimed at the home buyer. There is even said to be a gentlemen's agreement not to publicize national shows widely abroad.

Now, because several shows are being held regularly at two-year intervals, there is some question as to whether a biennial pan-European exhibition is really necessary. Many participating nations now feel that they cannot adequately present their machines at such an exhibition, especially when it is not held on home grounds. A national show, they think, provides an opportunity for many builders to participate who would not take part in shows staged outside the country.

The Germans, especially, have been dissatisfied with space and weight limitations of the last European exhibition, at Paris.

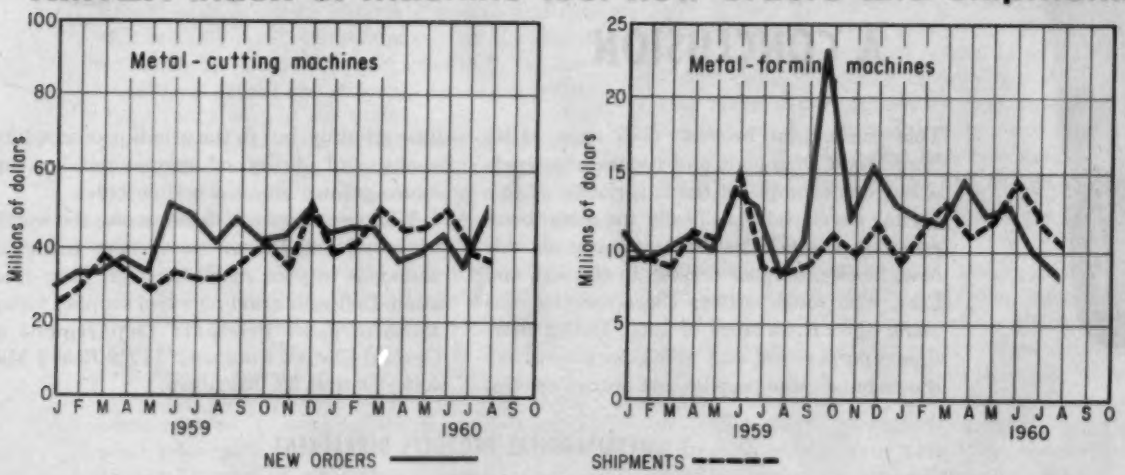
Certainly there could be no complaints on that score at the just-finished Hanover show, which occupied the same area as the European show staged there in 1957, but which had 750 exhibitors instead of more than 1000. Notable absentees, however, were machines from the United States and from Iron Curtain countries.

But 130 non-German exhibitors were on hand from eight countries, including 15 from Britain.

Biggest Hanover machines, incidentally, were a 3000-ton Schuler (German) transfer press — largest in Europe, if not the world — and a Waldrich (German) tape-controlled roll-turning lathe.

The feeling in Europe, generally, is not that international shows should be eliminated entirely, rather that they should be held at longer intervals, say every five years, as is America's Machine Tool Exposition.

NMTBA Index of machine tool new orders and shipments



New orders for metal-cutting machine tools rose sharply in August, reaching a figure of $49,450,000, according to preliminary figures from the National Machine Tool Builders Association. Orders in July were $33,500,000. Shipments in August were $36,450,000, down from $39,450,000 in July. Orders for metal-forming machine tools ran to $8,100,000 in August, down from $9,450,000 in July. Shipments dropped to $10,700,000 in August, down from $11,850,000 in July

A REPORT

on the superior tailor-made qualities of

G-E MAN-MADE DIAMONDS for METAL BOND WHEELS

A COMPARISON

In the electrolytic grinding of more than 311,000 miscellaneous carbide tools, six metal-bond wheels containing General Electric's latest type MBG Man-Made Diamonds were given a direct comparison to six wheels containing natural diamonds. The result shows a 22.5% superiority of G-E Man-Made Diamonds over natural diamonds.

Diamond Type	No. of Wheels	No. of Tools Ground	Avg. Wheel Wear Inches	Avg. Cu. In. Carbide Removed	Avg. Cu. In. Carbide Removed Per Cu. In. Wheel Wear	Efficiency Ratio
G-E MBG	6	160,713	.0605	90.885	70.2	122.5
Natural	6	150,496	.0644	80.181	57.3	100.0

A CONCLUSION

This comparison between G-E type MBG Man-Made Diamonds and natural diamonds is but one example of the superiority of this crystal developed specifically for metal-bond grinding wheels. The announcement of this new, blocky, tougher crystal, in 80-mesh and finer, with rough surface characteristics, was made by G.E. in April of 1960. In this short time reports reveal that MBG diamonds have shown outstanding results, not only in electrolytic grinding, but in the grinding of sapphire, slicing and dicing of germanium, cutting coarse-grained alumina and carbides.

Your own tests will demonstrate the worthwhile advantages of these new industrial diamonds in your metal-bond grinding operation. Call your grinding wheel supplier today. Metallurgical Products Department of General Electric Company, 11149 East 8 Mile Ave., Detroit 32, Michigan.

METALLURGICAL PRODUCTS DEPARTMENT

GENERAL ELECTRIC

CARBOLOY® CEMENTED CARBIDES • MAN-MADE DIAMONDS • MAGNETIC MATERIALS • THERMISTORS • THYRITE® • VACUUM-MELTED ALLOYS

MATERIALS...

Aluminum bumpers...

Current interest in aluminum for automotive parts is continued with the Ford study of extruded aluminum bumpers for the Falcon and the Comet compacts. Chrysler has been working with Reynolds on extruded aluminum bumpers for the Valiant but production costs based on the Chrysler studies show no advantage over steel bumpers. In fact, at this stage of development, cost of an aluminum bumper is said to be higher than for steel. Both Kaiser and Alcoa are trying to break into the market with stamped aluminum bumpers.

Compacts cut steel use...

Aside from the use of other materials, the reduced size of the compact cars will cut into the use of steel for 1961 cars. The decrease in steel consumption in the auto industry is expected to run nearly one million tons in '61. This estimate is based on expected sales of two million compacts in '61 with each car using about 1.3 tons of steel. Standard cars have used about 1.7 tons of steel each, hence reduction of 24% for each compact car is sizable. The slight reduction in standard car size for most '61 models will reduce the tonnage even further.

Steel promotes "personality"...

Identified as its "Study in Steel," a broad new program has been announced by the United States Steel Corp. Determined to resist the encroachment of other materials, and to find new markets for steel, the company has decided to promote its product's "personality." By personality is meant the strength, ease of working, appearance, etc, of the metal.

Bay E Estes, Jr, U S Steel's commercial vice-president-marketing, described the "Study in Steel" as "a major step in our campaign to create new frontiers for steel." The move came after two years of intensive study and development work in the design field. Peter Muller-Munk and Associates, internationally known industrial design firm, was commissioned to conduct the study for US Steel. With an entirely new design concept in office furniture as a focal point, the ideas covered toys, water towers, stadium seating, a camping trailer and modular steel kitchens.

Designs are based on taking full advantage of steel's strength in tension and compression. In addition, vinyl-covered steel sheet and urethane-foam filler under pressure play an important part. Foam-filled walls for drawers and cabinets are expected to improve steel's competition with wood. Cantilever supports and modular design are characteristic of these suggestions. Designs are available free to manufacturers and US Steel will provide manufacturing suggestions.

Densified wood veneers...

Pressed wood material, imported from Holland by Lignostone, is made from beech veneers 0.040 or 0.078-in. thick before compression. The finished material, which is bonded with 15 to 26% phenolformaldehyde resin (depending on application), can be furnished with specific gravity of 0.9 to 1.38. This material, which has great impact-, bending-, and tensile-strength, is lighter than metal, easy to machine to close tolerances (with HSS or carbide cutting tools), oil resistant, and has a low moisure-absorption point. Primary use in metalworking is for general steel rule die applications involving accurate blanking, piercing, trimming, and forming operations. The high mechanical and dielectric strength, low moisture absorption and good insulating characteristics suggest the use of this material for electrical equipment such as switchgear, connectors, levers, rods and panels. The impregnated wood also can be used for rings, shafts, gears and bearings.

Teflon-coated screen...

Industrial wire cloth has some interesting properties when coated with Teflon, according to the Cambridge Wire Cloth Co, Cambridge, Md. A typical application of this material is in a filtration operation where water is present. The Teflon has a tendency to hold the water back and allow other liquids to pass through. The coating can be applied evenly over the entire surface of the cloth and will not interfere with openings in mesh sizes as fine as 180 per inch.

Shielding...

Between the problems of radiation and the problems of corrosion, and some special new atomic problems involving both, shielding takes on very significant importance. Whether we use reactors for power, put them in ships, or send them through the air, every living thing must be guaranteed protection against radiation. Knapp Mills Inc, New York City, specializes in shielding materials, principally using lead. Combinations of lead for gamma shielding and/or light materials for neutron shielding with steel, aluminum, copper, etc, have created a whole new industry.

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WHAT'S AHEAD... in Metalworking

TRENDS

Few bright spots in the metalworking outlook...

The post-Labor Day upturn never came. The more optimistic industry spokesmen are looking for a pick-up in business around the middle of this month; the others are just looking for business.

Steel production is climbing slowly, but many mills report that October orders are not as heavy as had been expected. The operating rate is now about 15 points below the actual chop-up, or consumption, rate of steel.

Tool and die shops are also hoping for a good October. They have finished the tooling jobs for Detroit's 1961 cars, have not heard anything on the 1962 models, and currently question where the business they are looking for will come from.

Commercial heat treaters report a slight pick-up in business, but it appears too little and too late to help them break even with 1959. Operators complain about the lack of volume jobs, and say that it is nearly impossible to break even on small lot jobs at current prices.

Farm and construction machinery builders can see nothing on the horizon that will boost their sluggish business. Inventory is high, and more workers are expected to be furloughed.

Small motor production is still rising. Most of the demand is from builders of office machinery, and while demand from the machine tool industry is presently weak, it should pick up with the recent increase in machine tool orders.

Cutting tools are selling well, but the rate seems to be leveling off. Cutting tool manufacturers attribute much of their increased business to new products such as recirculating ball screws and recirculating way bearings for tape-controlled machines.

Metal stamping plants report business at about the same levels as last year, with 1960 expected to equal 1959 as a whole. Backlog is steady, and there is the possibility of a price increase of about 2%, maybe by the end of the year.

The American Gear Manufacturers Association's latest monthly index of bookings shows a decline of 19.4%. The index stands at 217.5 (1947-49=100).

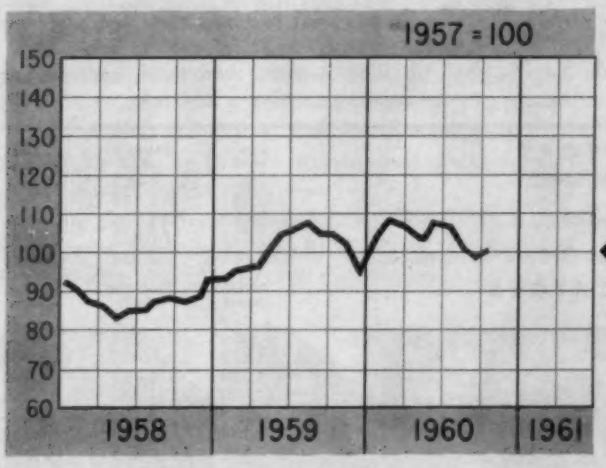
Sheetmetal shops report business steady, even a little up. Business is running quite close to last year's levels. Prices are steady and the backlog is about the same as in 1959. Most companies expect steady across-the-board business the rest of the year.

Railroad car ordering is slow. Business is well below that of the first six months of the year. Although there is no solid indication of an upturn, spokesmen see some chance of better business this month.

Aircraft parts manufacturers are still waiting on Washington. Since the end of the fiscal year, these manufacturers have been waiting for reinstatements or initiation of new programs but, so far, no concrete evidence of activity has come in.

Business in metalworking job shops increased slightly in the last month. Most concerns report steady backlogs and slowly rising prices.

The dip in AM/MM's Index of Metalworking Production reflects, mainly, the drop-off in automobile production during the annual changeover period.



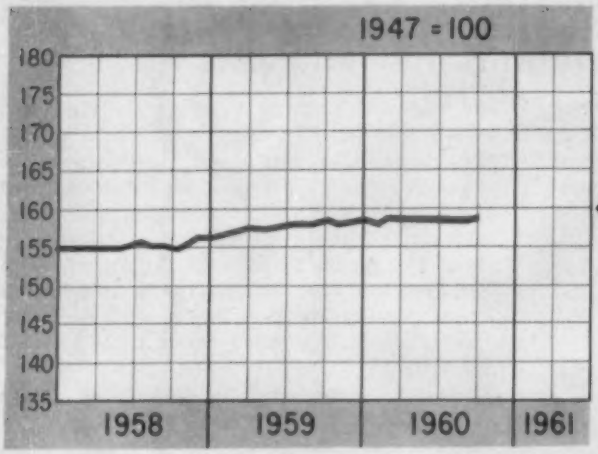
100

AMERICAN MACHINIST INDEX OF METALWORKING PRODUCTION

BASED ON MANHOURS WORKED IN THE FIVE COMPONENTS

	SEPT Estimated	AUG Preliminary	JULY Revised	AUG Year Ago
Total Index	**100**	**99**	**101**	**105**
Machinery	**99**	**102**	**103**	
Electrical Machinery	**108**	**102**	**112**	
Autos	**83**	**102**	**106**	
Other Transportation	**87**	**87**	**96**	
Other Metalworking	**111**	**107**	**96**	

TRENDS WHAT'S AHEAD... in Business



AMERICAN MACHINIST INDEX OF METALWORKING PRICES

	SEPT Estimated	AUG Preliminary	JULY Revised	AUG Year Ago
Total Index	**159.8**	**159.4**	**159.4**	**159.4**
Metalworking Machinery	**192.4**	**192.4**	**187.8**	
Other Machinery exc. Electrical	**172.8**	**172.6**	**171.3**	
Electrical Machinery	**159.4**	**159.6**	**162.2**	
Fabricated Metal Products	**147.6**	**147.6**	**148.5**	

Incomes and the consumer buying outlook...

Personal income again inched to a new high during August, hitting a seasonally adjusted $408-billion rate for the month. Personal income to date this year has run $21 billion ahead of last year's comparable period.

The gain in August wasn't very impressive, however. The increase was only $300 million, compared with a $1.2-billion rise in July. And in large part, the gain reflected wage increases granted to federal employees. Whereas, payrolls in manufacturing actually declined during the month.

But we're likely to see healthier gains in the months ahead. One reason for the slip in manufacturing payrolls was the model changeover in the auto industry. And this also explains in part the sizable increase in the unemployment rate registered for August. So the fall pickup in auto production should improve both these pictures.

Nevertheless, even temporary income cuts can have an adverse impact on consumer buying. And the cut in factory earnings undoubtedly figured in the sales lag during July and August, when consumer durable sales were about 5% under June 1960.

The latest report on consumer intentions from the University of Michigan indicates that plans to buy autos and other durables are still widespread among consumers. And this is encouraging. However, their buying mood hasn't improved in recent months.

And consumer feelings about general business conditions aren't reassuring. A greater number are feeling pessimistic about the course of business in the months ahead. And this may make them hesitate about taking on new durables and the installment debt that usually accompanies such purchases.

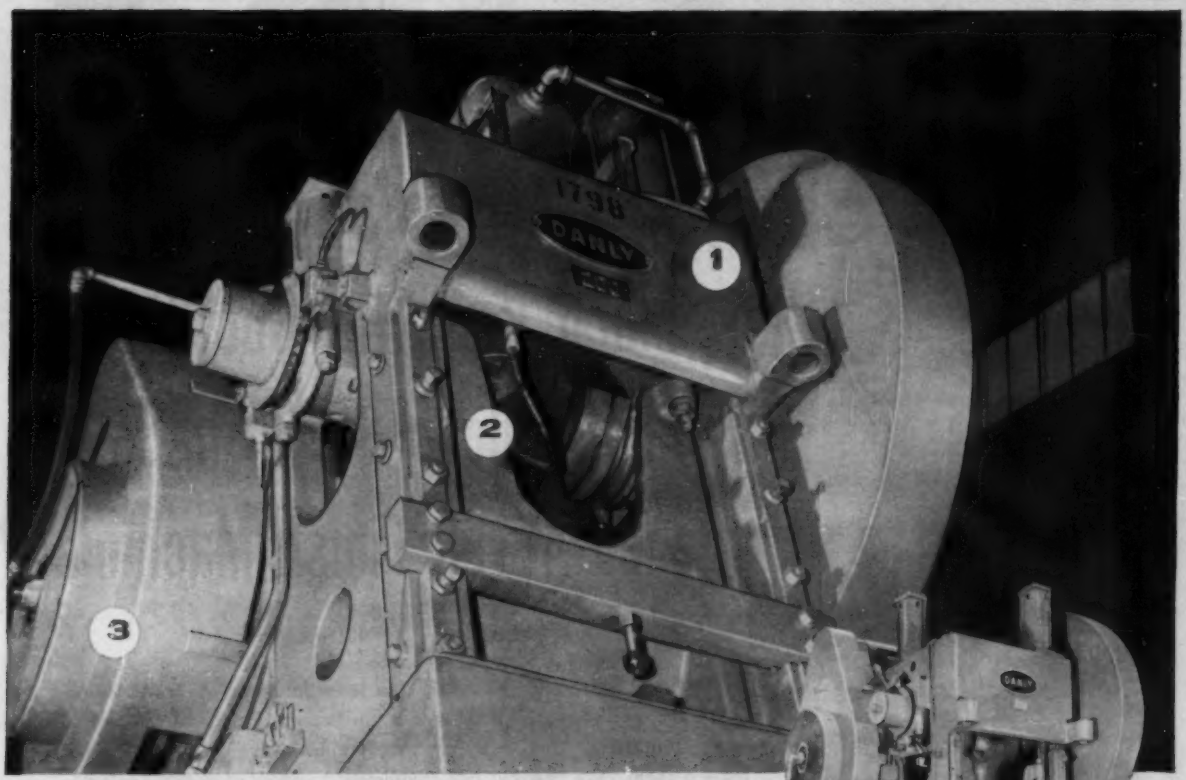
But with personal incomes high and prices relatively steady, consumers are in a position to step up their buying. And in this atmosphere, salesmanship can play a key role.

WEEKLY BUSINESS INDICATORS	*Latest Week*	*Preceding Week*	*Year Ago*
Business Week Index of Activity (1947-1949=100)*	146.5	144.7	147.5
Steel ingot operation (thousands of tons)	1,537	1,510	362
Electric power output (million Kilowatt hours)	13,903	14,216	12,779
Production of automobiles	85,999	52,635	62,716
Engineering construction awards (Eng. News-Record, thousands)	368,351	423,330	410,685

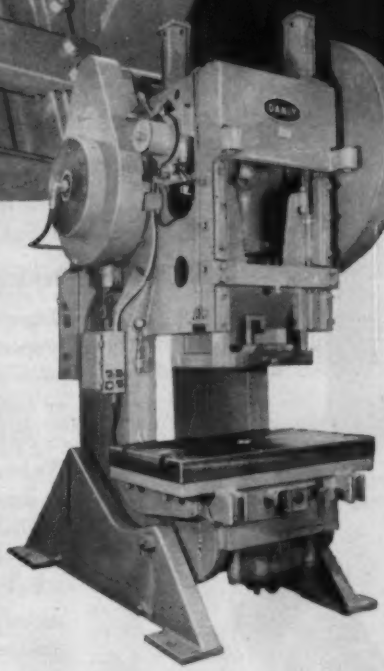
MONTHLY BUSINESS INDICATORS	*Latest Month*	*Preceding Month*	*Year Ago*
Index of industrial production (1957=100)*	109	110	104
Index of durable manufacturers production (1957=100)*	104	106	98
Durable goods manufacturers' sales, millions*	14,810	14,880	15,384
Machinery manufacturers' sales, millions*	4,730	4,740	4,778
Durable goods manufacturers' new orders, millions	14,060	14,340	15,493
Machinery manufacturers' new orders, millions	4,570	4,690	4,893
New Orders for Nonelectrical Machinery (1950=100)*	179	176	182
New Contracts for Industrial Construction (1950=100)	151	154	141

*Seasonally adjusted

FROM ANY ANGLE



IT COSTS LESS TO RUN A DANLY O.B.I.



(1) **Compare a Danly welded-steel frame,** for example, with any comparable press available. A Danly frame is designed to the most rigid deflection standards, with extra brawn to resist shock and vibration. This means longer die life, less downtime for die maintenance, and more accurate stampings, too.

(2) **Compare the drive . . .** the forged and heat-treated crank shaft, the bronze-bushed bearings, the quiet gearing. Danly O.B.I.s are built to defy breakdowns . . . to give you bonus productive hours.

(3) **Compare the clutch . . .** the same patented air friction clutch that has made Danly presses standouts in major stamping plants around the world. Because of its low inertia design, and long-life floating friction inserts, your maintenance department can almost forget it's there.

Compare a Danly O.B.I. from *any* angle. You'll find it's built for lower cost, more dependable operation. Write for the new Danly O.B.I. Catalog and the detailed specifications will convince you.

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Because Armco 17-4 PH Stainless Steel has such good mechanical properties and corrosion resistance, you can lower the production costs of many parts now made of plated low alloy steels, non-ferrous alloys, or hardenable stainless grades.

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American Machinist / Metalworking Manufacturing ESTABLISHED 1877

Our Leadership—Let's Keep It

Are we Americans eventually to become a nation of merchants selling imported goods to our people? Or are we to maintain and strengthen our world leadership in the manufacture of consumer and capital goods?

These questions, put time and again lately by many thinking people, are an over-simplification, to be sure. But they bring vividly to the attention of all of us the dilemma before us.

For the past few years U S metalworking companies making all kinds of products have been investing heavily in production facilities abroad, especially in western Europe. They plan to pour even more millions into foreign operations next year than this year.

This flight of capital...

overseas, along with expert American management and technical skill, inevitably means fewer plants and fewer jobs here at home. If this flight should continue at a stepped-up rate, its seriousness can be a real threat to the growth of our national economy.

Most alarming is the ability of European and Asian manufacturers, thanks to very low labor rates, to undersell us in their home markets, in world markets, and right in our own country. The situation provides a tempting invitation to U S companies with plants overseas to ship products back here and thereby compete better at home. In fact, some manufacturers—of typewriters, sewing machines, tractors—are doing exactly that.

Sounds pretty dismal. But things are not as bad as they seem. That is, we should be able to continue competing successfully for domestic and foreign business if we will put our minds, our managerial skills, our superb technical know-how, our hearts and our courage into the job ahead.

We should measure our markets carefully and tailor our products to fit. Whatever we do, we should give our customers the kind of products that they want, not the kind that we think that they should have. Note the revolution in cars when Detroit finally took the foreign threat seriously.

We must have the understanding . . .

and cooperation of labor. If any single group has a lot at stake in this difficult situation, it is the labor unions. Their leaders know full well that yearly increases in wages, without commensurate gains in productivity, will spell out still higher costs and higher prices, and our competitive position would be worsened.

Management can do many things, some of which already have been enumerated. A prime responsibility is to see that its plants are equipped with production machinery of 1960 design and performance. Without the help of such machinery, lower costs will be impossible and the tolerances specified in today's products cannot be satisfactorily met.

All of this...

admittedly is easier said than done. The main point is that, on the basis of a brilliant past performance, we have it within ourselves to meet this new and troublesome challenge. However, we'd better get going now and not wait until a later time when only herculean efforts will pull us through.

Burnham Finney EDITOR

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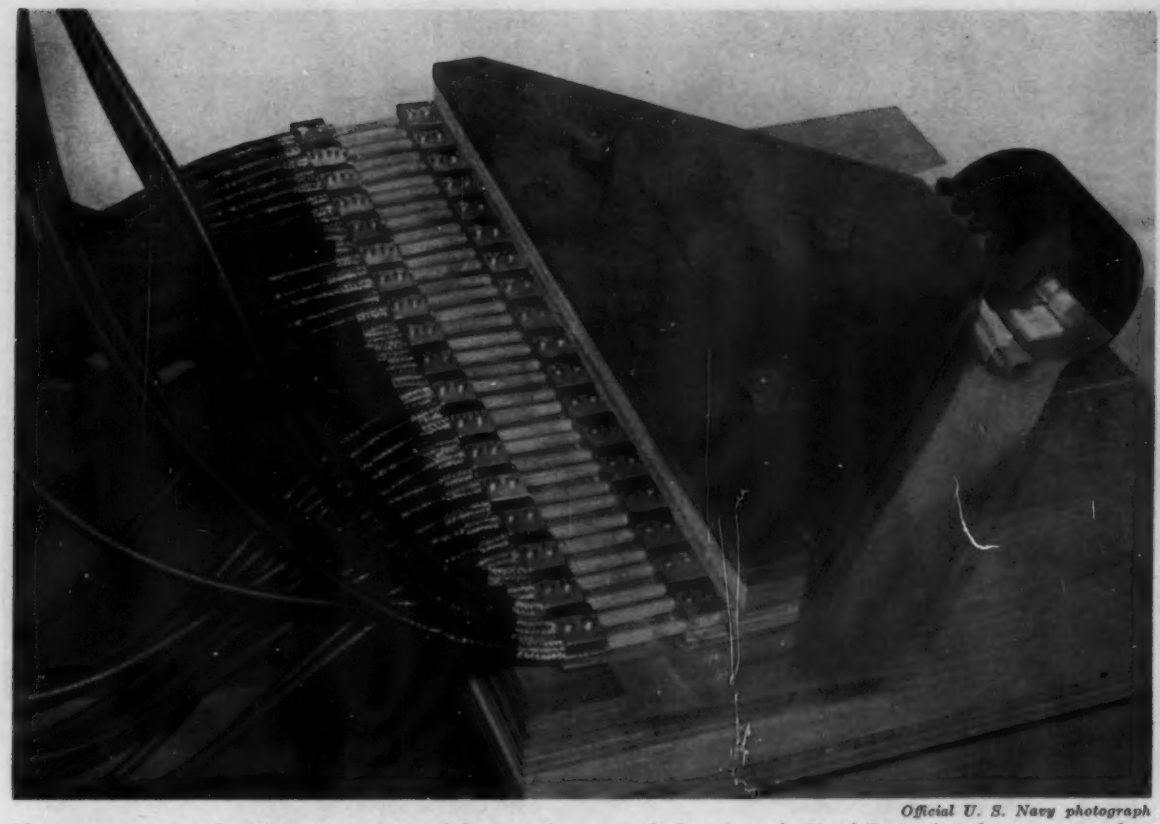


Official U. S. Navy photograph

Electromagnetic swager—10,000-amp current is fed into coil (upper right), instantaneously clamping brass ferrules by electromagnetic force to coaxial cables inserted in center orifice. Current from condenser bank is fed into parallel iron plates attached to the coil. Naval Research Laboratory now plans to build a two-headed swager that can use 7- to 10-million ampere currents—the current, of course, depending upon the size of the coils

It's been rumored for over a year*.
Now the wraps are off
on a startling new process . . .

MAGNETIC forming!

Magnetic force so powerful that it literally drives metal molecules inward upon themselves—this is metalworking's spectacular new forming tool.

Invisible, it can form metal in a few thousandths of a second—just the time required to discharge a condenser bank.

First details on the new method of compressing metal to shape have just been released by officials of the Naval Research Laboratory in an exclusive interview with the editors of AM/MM.

First available data

Several U S firms have been working on magnetic forming, which is a member of the headline-grabbing high energy forming family (explosive forming, electrical discharge forming), in recent months. But to date, their efforts have been strictly hush hush. The Naval Research Laboratory, however, has not only given out the first information on the process, but also on a new blowout switch that greatly improves its practicality.

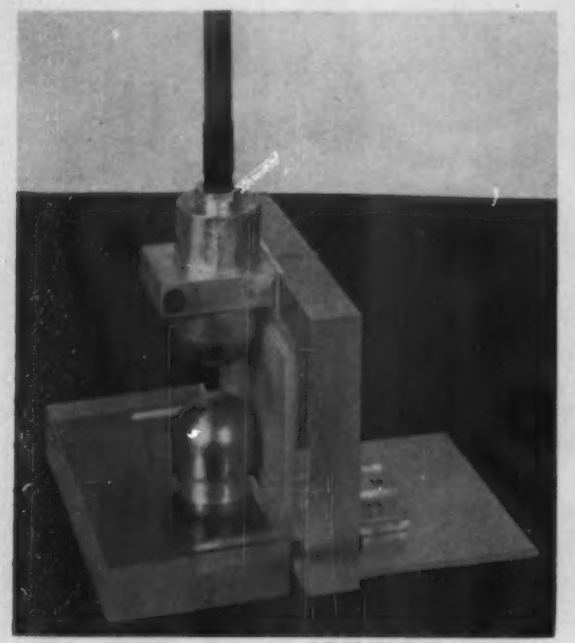
The Laboratory is using magnetic forming to swage tubes—in this case connectors for coaxial cable. The brass tubes are slipped over the cable ends and magnetic force compresses them into tight-fitting sleeves. So far, the Lab's magnetic forming is limited to fairly small tubes—small because of a limited amount of force, tubes because the coil is doughnut-shaped (see photograph).

Other shapes possible

But the possibilities of magnetic forming are limited only by the

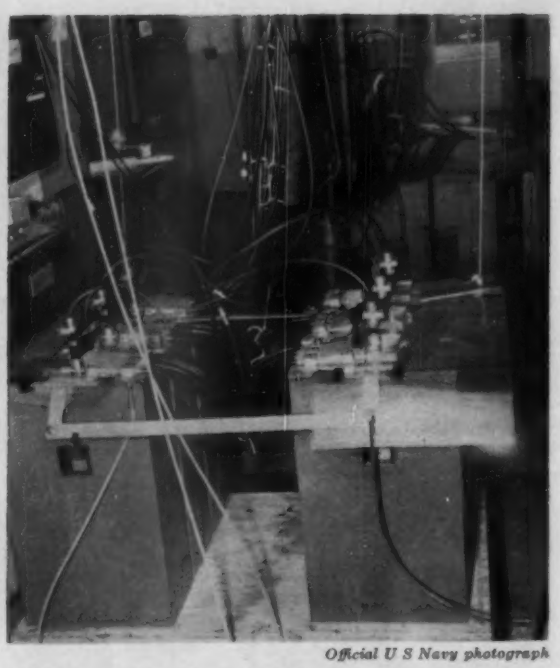
* From AM/MM "Metalworking Report," November 16, 1959: "A demonstration at Geneva last year proved that magnetic energy can create a shock wave that will form metal, and development work . . . has been started."

Magnetic forming . . .



Official U. S. Navy photograph

Magnetohydrodynamic switch has upper and lower brass electrodes, with a connecting backstrap which sets up an electromagnetic field. Field pushes current passing across the electrode gap off to side, reducing erosion



Official U S Navy photograph

Laboratory setup—Blowout switches are mounted on top of condenser bank at Naval Research Laboratory, Washington, D. C. Lead-off cables flow into electromagnetic swager in small table at upper right

amount of available force, and by the shape of the coil. A pancake coil, for example, should permit forming of many other shapes. And if magnetic force were to be coupled with dies, the possibilities would be almost infinite.

Developed by General Atomics

The Laboratory's electromagnetic swager was actually developed by the General Atomics Division of General Dynamics Corp, and brought to Washington by Dr Alan Kolb, research director of NRL.

Dr Kolb's assistant, Leonard Melhart, subsequently developed and patented a "magnetohydrodynamic" (electromagnetic) blowout switch, which has a longer life than earlier devices for controlling the process.

Joint NRL-AEC Project

At the Laboratory, the single-headed, iron-plate swager compresses brass ferrules to form coaxial cable connections. Some 6000 of these connections will go into a condenser bank that the Laboratory is building for producing neutrons from the fusion of hydrogen atoms—part of a joint Naval Research Laboratory-Atomic Energy Commission experimental program for controlling thermonuclear reaction.

Although the magnetic swaging process has not yet been fully developed, it is believed that it and the connections it produces will be widely adopted by industry. NRL's coaxial connections are made on Belden YK-198 and Rex No. 2 cable, but electromagnetic swaging may be used on virtually any type and size of cable.

How it works

As to the machine itself: Blowout switches connect six Cornell-Dubilier 14 microfarad condensers, arranged in parallel, with the swaging head. These newly developed switches are simply gaps between two copper electrodes in the transmission lines.

A 100,000-ampere current flows across the gap when triggered by an external spark. Then the magnetic field of a copper backstrap (which connects the two electrodes for the return current) drives the current flowing across the gap away from the closest contact points of the electrodes.

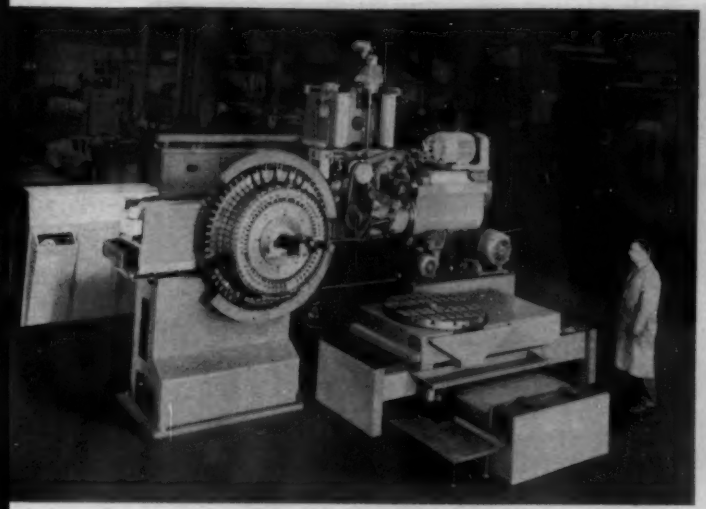
In effect, this eliminates heavy, disabling wear on central electrode areas. By relocating the current flow off to the sides of the electrodes, where the problem of erosion is not critical, this "magnetic insulation" greatly prolongs switch life.

Switches to be sold commercially

After receiving proposals from four metalworking firms in response to a recent invitation to produce the Melhart-designed switches, the Naval Research Laboratory has awarded a contract for 400 of them to Service Machine Co of Baltimore. One of the bidders, Wilkes Precision of Bethesda, Md, had previously made 100 switches for NRL, now plans to make and stock them as on-the-shelf items, priced at about $30 each.

Better spark plugs?

One potential commerical adaptation of the new switch is as a spark gap for lightning protection. Conventional lightning protection equipment is usually unserviceable after one grounding, but the magneto-hydrodynamic switch could be used over and over. Another commercial possibility for magnetic insulation: long-life auto spark plugs.



60-station tool magazine with automatic changer (operating from center of drum) is available on Sundstrand's OM-3 5-axis Omnimil. Head has two spindles with different ranges plus an axial feeding spindle for drilling and tapping.

Model III Milwaukee-Matic with 30-tool magazine changes tools in 15 seconds. Work is mounted on pallet with 28x36-in. surface, automatically transfers to index table, which can rotate at 10 rpm to any of 360 positions in 1° steps

Chicago Postscript:

Eight builders run shop demonstrations

A number of machine tools of new design could be seen in operation at the plants of their builders during the recent Machine Tool Exposition. Verson Allsteel Press ran a formal showing, with helicopter service from the Amphitheatre; and The DoAll Co had a show in its Hall of Progress, with bus service from the Navy Pier and the Coliseum.

For the most part, other builders were not running formal open houses but were welcoming those who asked to visit their plants while in the Chicago area to see machines that were on the floor at the time.

N/C at Sundstrand

Four numerically controlled machines at the Sundstrand Machine Tool plant in Belvidere, Ill, included two Omnimils and two variations on the Model 21 3-axis machine with 20-position tool changer that could be seen at the Amphitheatre.

One of the Model 21 machines was identical with the one shown in Chicago except that it had a Thompson - Ramo - Wooldridge contouring control. The other had an 8-station tool turret instead of the 20-position tool drum.

Sundstrand's OM-3 5-axis Omnimil (see cut) has a 60-station tool magazine that will handle cutters to 11-in. OD. The tool changer returns tools from the spindle to the original location in the magazine, which then indexes to bring the next tool into position.

There are really three spindles on the OM-3. The spindle head, which can rotate 360°, has a high-speed spindle (161 to 5000 rpm), a low-speed spindle (38 to 1200 rpm), and an axial-feed spindle for drilling and tapping operations (161 to 5000 rpm, 7.5 in. feed range). Spindle motor is 15 hp.

There is a 42-in.-dia rotary table and the machine will work on parts within a 24-in. cube on any exposed surface at any angle. The machine has a Thompson-Ramo-Wooldridge contouring control.

The OM-4 shown in the Sundstrand plant is basically the same machine as the OM-3 in a larger size and without the tool changer. It has a 58-in.-dia table and will work within a 48-in. cube.

Instead of the tool changing drum, the OM-4 has a 72-position tool magazine constructed like a lazy Susan. The numerical control system rotates the magazine to present the next tool to the operator for manual change. The upper rack handles tools to 3⅛ in. dia and the lower rack has 24 positions with 5-in. dia and clearance for tools to 16-in. dia. A loading mechanism is provided to assist in handling large tools. The spindle drive motor is 40 hp.

"Model III" unveiled

In Milwaukee, Kearney & Trecker demonstrated the Model III Milwaukee-Matic (see cut), a model of which was shown in the K&T booth at the Machine Tool Exposition. The Model III is larger than the familiar Model II but has essentially the same principles. The drum holds 30 tools and is on the front of the machine. Tools up to 6-in. dia can be stored. Tool shanks are keyed so that they can be placed in any position in the drum and tools are changed in 15 sec by exchanging the tool in the spindle for the required tool in the drum. The 15-hp spindle has speeds from 50 to 2000 rpm in 10 rpm increments.

Feed rates are ½ to 49 ipm on

all three axes with a rapid traverse rate of 150 ipm. Longitudinal travel is 44 in., vertical is 34 in., and depth is 32 in. The work pallet is 28x36 in. on the surface and transfers automatically when loaded to the index table which automatically indexes to any of 360 positions (1° increments) at 10 rpm. The Model III has General Electric numerical control.

Variety at Ingersoll

An openside vertical miller with a 50-hp spindle and 3-axis numerical control (GE Mark III) could be seen in the Ingersoll Milling Machine Co plant in Rockford. Table travel is 10 ft, and head travel is 36 in. front to back, with spindle travel of 24 in.

Other new Ingersoll machines included the gantry-type miller (see cut) using carbide tools to mill steel weldments. A 14-ft adjustable rail milling machine has four milling heads ranging from 100 to 250 hp each.

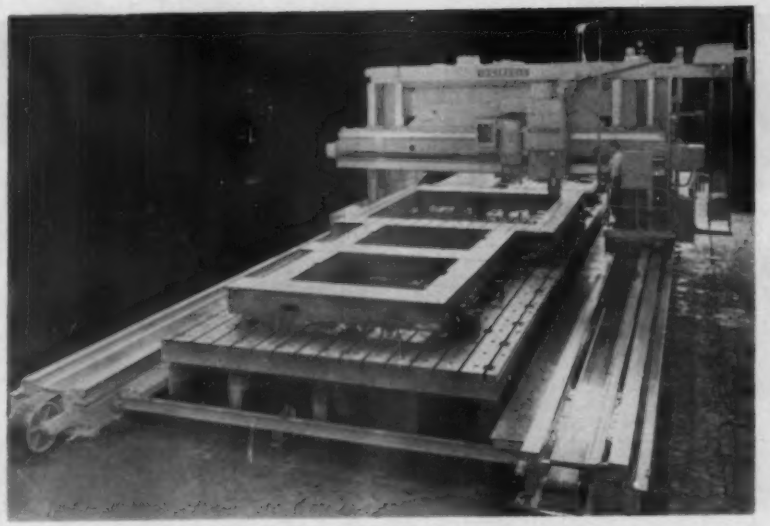
The new 6½-in. bar traveling housing machine for general purpose boring has split work tables to allow loading and inspection while boring. The machine has 78 in. vertical head travel, 18 ft horizontal housing travel, and 36 in. housing cross travel.

Also seen in the Ingersoll plant were some smaller machines. A 30-hp vertical-spindle fixed-rail milling machine has a 24x66-in. table with 60-in. travel and a 20-hp dc drive with spindle speeds of 100 to 300 rpm. A new automatic cutter grinder has cam control of the grinding action and will grind cutters from 4 to 20-in. dia. The machine can cut its own cams from cutter blades or masters by replacing the grinding wheel on the head with a steel disk that serves as a stylus and traces the contours of the blade. Cam stock is mounted in a fixture on the cam magazine and an air-powered end mill is mounted in a block on the machine base, cutting the cam contour.

Greenlee's big automatic

Greenlee Bros & Co in Rockford started showing its new 3½-in. capacity 6-spindle bar automatic (see cut) last June. In operation at the plant in September, the machine was notable for the speed of carrier indexing in a machine of such size.

Greenlee was also showing two smaller bar automatics, and the two-post and four-post trim presses. The B&T Die Casting Machinery Div of Greenlee had a 1000-ton cold-chamber, high-pressure injection machine for aluminum die casting of automotive parts. Platens are 5-ft square and 1-ft thick. The four tie bars are 8-in. dia and the machine has checked out at a 1200-ton lock-up pressure.



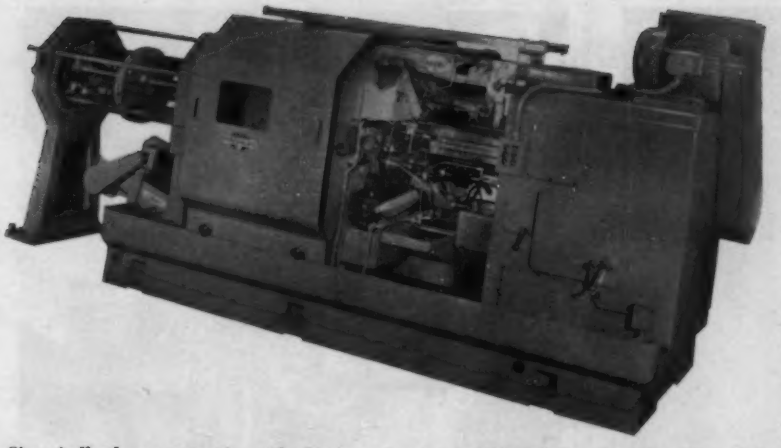
Gantry-type adjustable-rail milling machine developed by Ingersoll conserves shop space by moving the milling head instead of the table. Table will handle steel weldments 17 ft wide, 6 ft high, and 40 ft long. The single 100-hp milling head uses carbide cutters. When machine is delivered it is expected to replace five planers

Size 2516 engine lathe with numerical control introduced by Clearing-Axelson for stepped-shaft turning, facing, and boring provides both tape and dial operation. Automatic index is provided on 7-in. square tool turret

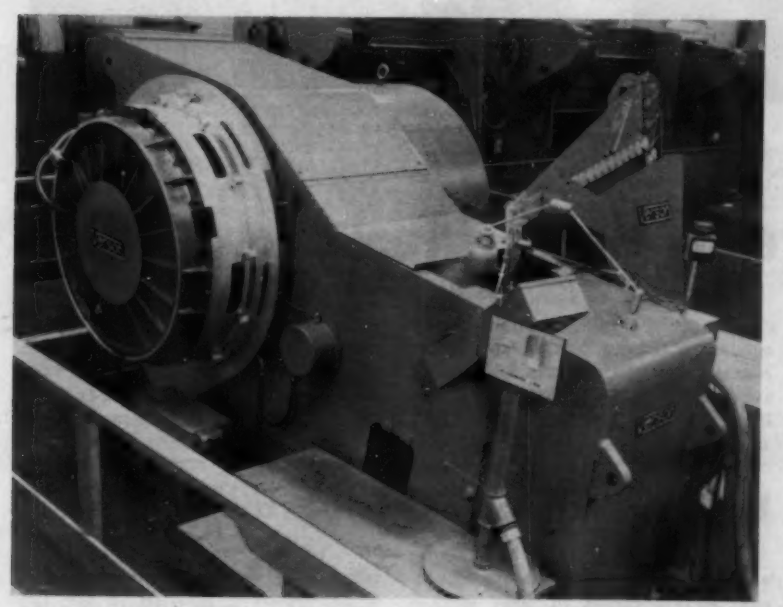
Verson holds show

At the Verson Allsteel Press Co show at its plant in Chicago, 21 machines were on display. A highlight was the 400-ton horizontal extrusion press (see cut) that can turn out 7-oz beer cans at 200 per min. Verson will supply a complete can-making system including a blank feeder, trimmer, and sealing unit.

A simplified type of rolling bolster arrangement was demonstrated on a 600-ton eccentric press. Two 66x120-in. bolsters are connected by a drawbar arrangement. When a die change is required, a hydraulic cylinder raises the bolster on short sections of rail, so that it can be pulled out on tracks. A dc motor drive shifts the bolsters. When the other bolster with its new die is in position in the press, the cylinder descends, the bolster is located, and die clamps grip the punch.



Six-spindle bar automatic with 3½-in. capacity introduced by Greenlee has the same independent, cam-operated crossslides and open tooling area found on smaller Greenlee automatics



400-ton horizontal extrusion press introduced by Verson will produce 7-oz aluminum beer cans at rate of 200 per minute. The press can impact extrude from slugs a can up to 4-in. dia and 7-in. depth

A major series press brake had the Verson 30 and 8 strokes per minute duo-speed clutch for rapid advance, low forming speed, and rapid return. A 150-ton hydraulic molding press for glass fiber molding has a 60x60-in. platen area and a 48-in. stroke. The operating speeds are 165 ipm fast advance, 18 ipm pressing, 36 ipm slow breakaway, and 320 ipm fast return.

On the shop floor, Verson had a press that will be shipped to General Motors for making ball joints by impact extrusion. The firm has supplied extrusion presses for brake master cylinders on British cars and is working on larger presses for US models.

Clearing presses and lathes

Clearing Div of US Industries didn't have a publicized open house, but did have a number of new machines in their plant in Chicago and more than 1500 visitors came by personal invitation to see them.

A Clearing-Axelson lathe with a modified Mark II GE control was shown (see cut) with announcement that all Axelson lathes sold in future will be suitable for retrofitting with numerical control. In addition there were a Clearing-Axelson lathe without N/C and two Harrison lathes on display.

Six Torc-Pac presses were shown in the open-back design ranging from 22 to 110 tons. The Torc-Pac clutch design will be applied to all new designs of mechanical presses.

On display was the 15,000th press built in 28 years—A B4-800-120-90 bottom-drive mechanical draw press for Ford. The press has a 30 in. stroke at 18 strokes per min.

Clearing had a 350-ton automatic scrap shear which requires no operator. The machine has a 30-ft vibrator table to compact the scrap as it is fed to the shear. A hydraulic press, HO-300-72-48, for blanking, drawing, forming, and trimming, has closing and opening speeds of 960 ipm, and a pressing speed at 300 tons of 82 ipm. It has split cushions so two dies can be set up side by side and an extended slide to resist off-center loads.

Onsrud high-speed head

Onsrud Machine Works introduced a compact 50-hp milling head for conversion of planers or milling machines. It was demonstrated cutting an SAE 1015 steel billet (not annealed) at 342 rpm with a 10-in. Futurmil cutter at 0.25 in. depth of cut and 0.030 ipm feed. The surface obtained was about 35 micro-in.

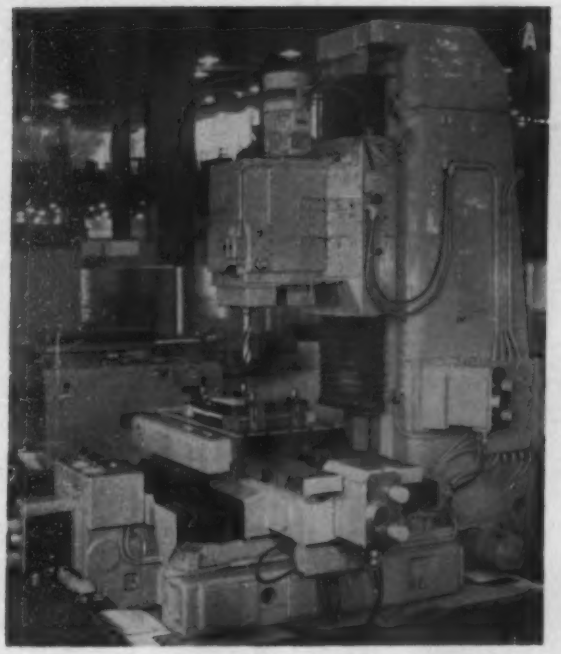
Other new Onsrud machines shown at the plant in Niles, Ill, included the tri-way mill with three high-speed milling heads designed for ferrous machining. The table is 18x72 in. with a feed rate of 280 ipm forward and 400 ipm return.

DoAll micro slicer

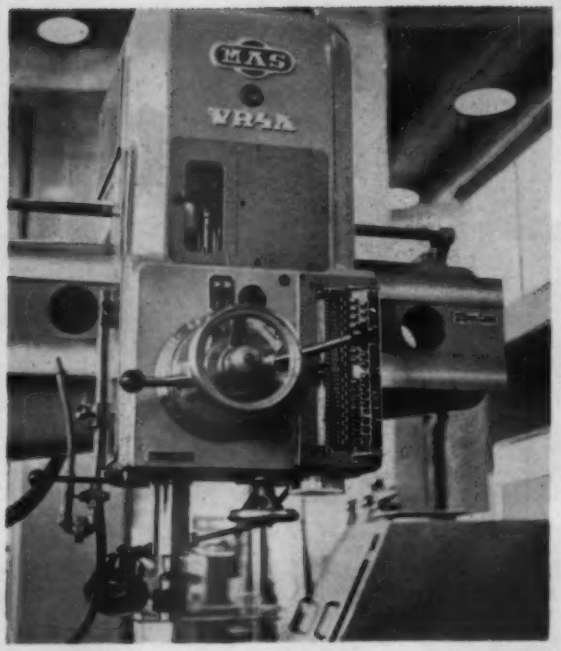
At the DoAll demonstrations in the Hall of Progress in Des Plaines, Ill, the I/D Micro Slicer was introduced. This method of slicing semiconductor materials with the inside edge of the cutting wheel instead of the periphery uses a cutting wheel only 0.008 in. thick.

DoAll also demonstrated the Electro Band machine for cutting honeycomb. An electric arc between the knife-edged saw band and the work parts the material before the blade touches it. Coolant quenches the arc.

The historical exhibit, "The Dawn of This Age," a display dramatizing the Industrial Revolution, served as setting for the DoAll display.



Renault's numerically controlled drill has a three-axis positioning system operating from punched-tape input. Accuracy is 0.004 in., repeatability is 0.0008 in.



Czech drilling machine has 41-in. arm, features pushbutton preselection of spindle speeds and feed rate. Tool changes are made manually; downfeed is set by pin stops.

Innovations at French Machine Tool Show

French machine tool builders and importers feel there is, at best, only a limited market in France for machines with highly sophisticated numerical controls and sophisticated price tags. Builders are moving more and more toward automatic operation, but they're keeping a sharp eye on costs when they design their controls.

This is the impression one gets from the 1st French Machine Tool Biennial recently held on the outskirts of Paris. Although Renault's prototype drill with numerical control rated as the individual standout, plug-board programmers and copying attachments were the predominant features of the show.

Plug-board programmers appeared on Somua's automatic turret lathe, on an MAS (Czech) lathe, and on a Salome-Freres lathe. On the latter machine, cycles, spindle speeds, and feeds are selected on the plug-board. The machine also has a hydraulic copying attachment which can sense tool pressure and vary longitudinal feed to keep linear advance constant on the workpiece profile.

Promecam's latest press, available in sizes from 16 to 250 metric tons, can be flipped over on its back to convert it from a vertical to a horizontal press. Other standouts were a merry-go-round loader for a La Precision Moderne gear hobber, Sciaky's electron-beam welder for welding reactor fuel element cladding, and the Languepin spark erosion machine, which can remove metal at rates up to 0.122 cu-in./min.

Bath stretch forms on a drawing press

Automakers will soon be looking at possibly one of the most significant developments in body work—"The first real change in draw-press technique." Cyril Bath Co, Cleveland, has invited them to Hoover Tool & Die Co, Detroit, to see hydraulic binder attachments on a conventional drawing press. These apply two-way stretch (not four sides as in a drawing die) to produce body panels to required shapes including contours.

Potential savings are said to be in the $100 millions; thinner stock can be applied because plastic flow throughout the sheet results in higher strength and hardness, common cold-rolled steel can be stretched instead of drawing stock, and tooling can be plastic dies that do not require contour copy-milling with Kellering machines.

Three major auto companies are interested; in fact, General Motors engineers have assisted in the development. The technique may be in time to apply to the 1962 auto-model run, assuming it can be integrated with other production processes. It is not far enough along or proven enough, for '61 production.

Two-way stretch pulls the stock just beyond the yield point, producing plastic flow in the sheet, even in relatively flat areas that would not flow in a drawing die. Tensile strength increases 10-20%, and Bath says 0.026-in. stock can substitute for 0.036-in. stock in automobile side panels. Only 1½ in. of excess stock is required on the edges of the part being formed.

Savings of $50/ton in steel would amount to 50-60¢ per car; tooling-up time might be as short as six weeks.

Do we need better welding standards?

- **Weld standards aren't realistic.**
- **Important areas are not covered.**
- **Acceptance limits are arbitrary.**
- **We need widespread agreement on standard procedures and terms.**

These and similar remarks were common at the AWS Fall Meeting in Pittsburgh last week. However, most of the comments did not wholly condemn the existing standards; the criticism was leveled, rather, at the factors of conservatism, confusion, and lack of uniformity, especially in nondestructive testing.

Fred Boehm, reporting on how the Schutte & Koerting Co applies magnetic particle inspection in the shop, closed with the hope that continuous efforts will be made to establish standards which can be used by supplier, manufacturer, and ultimate users. "Such standards," he said, "would instill confidence, based on the fact that nomenclature, limits of classes, and tolerances are clearly spelled out and understandable."

Sets up own standards

Meanwhile, the company has set up standards for its own shop and for its suppliers and has tried to keep costs within reason while still gaining the benefits of magnetic particle inspection.

In general, Schutte & Koerting employs it for the more critical parts such as code-welded pressure vessels, valve pressure castings weighing 200 lb and more, and critical weld areas on any highly stressed components. Another job for it is checking the various phases in reconditioning work on rejected parts.

Work on international stds

One place where something is definitely being done to promote uniform standards is in the international sphere. Commission V of the International Institute of Welding is engaged in a program leading specifically to standardization of magnetic and penetrant methods and formulation of acceptance standards. It has already made considerable progress in ultrasonic inspection of welds, according to R A Pulk of the Physical Sciences Lab, Ordnance Tank-Automotive Command.

Another problem, though, is conservatism, both in design standards and in quality control standards. There are too many inspectors who are impressed with the flaws they can discover with nondestructive testing. There are also too many designers who still think of welding as only a substitute for riveting, and others who use the lowest possible strength factors in calculating their designs.

This is probably a part of growing up. However, if welding is to continue to grow, **"The controls and restrictions imposed on welding during the early stages of its development should continually be reviewed and re-evaluated,"** says Jay Bland of General Electric Co.

In support of this statement, he mentions that certain discontinuities disclosed by nondestructive testing are arbitrarily considered flaws, even though they are in low-stress locations where they won't do any harm. On the other hand, some of the slag inclusions that are okayed might cause more trouble than a crack or lack of fusion that is automatically rejected.

Stronger than we think

On the subject of strength, L Stemann and E E Weismantel of The Budd Co claimed that most designers are downgrading the 300 series stainless steels unnecessarily. When designing a structure, they normally calculate on the basis of the annealed yield strength of 30,000 psi and the annealed ultimate strength of 75,000 psi, regardless of the temper.

In contrast to this, these authors reported that, "Tests on fusion butt welds in cold-worked materials showed that allowable stresses are considerably higher than the annealed properties generally used . . . observable deformation under test loads does not begin until well above the annealed yield strength." **In other words, the designers are not getting full value — full strength-weight ratio—out of the material.**

In spite of all this, "The over-all view is encouraging," to quote Mr Bland again. Welding has proved it can meet even the strictest requirements, and the designers, manufacturers, customers, and even the specification-regulating bodies are learning they can rely on it.

Papers cover wide range

But one of the reasons why welding continues to grow is that a great many researchers continue to learn more about it and to report their findings at technical meetings. The 51 papers presented at Pittsburgh covered the usual wide range of interests—all the way from the highly technical problems in metallurgy and mechanics to the down-to-earth applications in manufacturing operations. Structural design figured prominently this time, because four sessions were sponsored by the American Society of Civil Engineers and the Column Research Council.

New brazing alloys

On the manufacturing side, brazing was an important subject, and several new developments were reported to the meeting. One was a new high-temperature, manganese-base alloy that contains approximately 16% nickel, 16% cobalt, less than 1% boron, and the balance manganese.

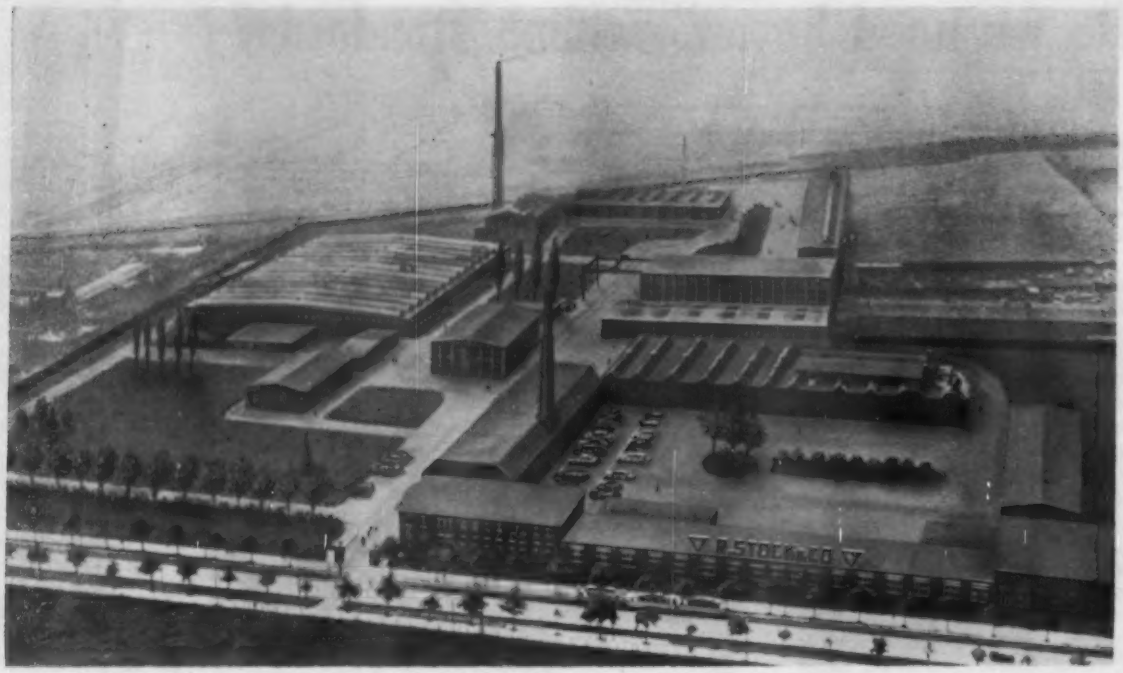
"This new alloy was developed to provide inherent ductility and reduce diffusion, which is a characteristic of the nickel-base alloys," says R C Kopituk of Thiokol Chemical Corp. Complicated brazed sections have survived subsequent welding with little or no cracking.

The latest findings in Armour Research Foundation's continuing search for self-fluxing, air-proof brazing alloys were presented by N Bredzs and H Schwartzbart. Briefly, the recent tests have demonstrated that adequate additions of zinc to the lithium-boron type air-brazing alloys can considerably improve their self-fluxing properties.

Uncleaned welds shed paint

Probably the most universal, down-to-earth idea presented to the meeting was J D Keane's paper on better painting of welded structures. The Steel Structures Painting Council has proved by exposure tests that the most important reason why paint fails on welded areas is that the weld wasn't properly cleaned before painting.

It turns out that the smoothness of the weld isn't significant. The important thing is to remove the alkaline deposit left by the electrode coating. Abrasive blast cleaning works best; chemical washing is also helpful; and even scrubbing with plain water is very effective.



Marienfelde (south Berlin) plant of R Stock & Co is 93.6% owned by Union Twist Drill of Athol, Mass, manufactures a wide variety of twist drills (10% to 15% of total German output) and other cutting tools, plus a complete line of Hartex grinders. Stock and Hartex products find wide acceptance in Western Europe, but are taboo just outside Berlin city limits, where Communist-dominated East Germany refuses to buy them, although they're badly needed

U S toolmaking subsidiary thrives in an "island in a Red Sea" . . .

OUTPOST in BERLIN

Berlin today could scarcely be called an ideal spot for an American firm to set up shop. Split into two cities of violently opposed political and economic beliefs, and completely surrounded by East Germany, Berlin is the front line in the battle between East and West for industrial supremacy.

Expects to double output

Yet an American-owned firm is not only prospering in this climate, it is laying the groundwork to double its present output.

The company, which goes under the somewhat top-heavy name of R Stock & Co Twist Drill, Tool & Machine Manufacturers A G of Berlin, is 93.6% owned by Union Twist Drill Co of Athol, Mass. The other 6.4% is owned by Germans, so that the company qualifies for listing on the Stock Exchange.

Biggest paradox in the Stock setup is that it is surrounded completely by a market that it can't touch—East Germany — even though there is a definite need in that area for its products: Stock cutting tools and Hartex grinders.

Yet Stock has managed to capture 10 to 15% of total German twist drill manufacture, in competition with 40 other manufacturers. Along with this, it has found a sizable market for its milling cutters, taps, dies, reamers and other cutting tools. These and its Hartex lines—hydraulic, cylindrical, and automatic centerless grinders, cutter and reamer grinding machines, tangent-arc profile grinders, and machines for longitudinal and plunge grinding—are finding a ready market elsewhere in West Germany, in England and the rest of Free Europe.

European demand high

So successful have the Stock cutting tool and Hartex machine tool lines been in the European market that the company is making little or no effort at present to market these products in the United States. If and when, however, UTD's German subsidiary is able to catch up with European demand for Hartex machines, the parent company may consider selling them in this country.

Stock was an established machine tool and cutting tool manufacturer long before Union Twist Drill took it over in 1956. Founded in 1887, it was engaged in assembly line manufacture of twist drills by 1896, successfully nosing U S twist drills out of the European market.

In 1925, the company began manufacture of Hartex grinders, and by the start of World War II, was a European leader in this field. With the end of the war, Stock, like most of Berlin, was rubble.

Rival "Stock" lines

During the war, Stock set up a branch plant in Thuringia, which was quickly taken over by the Russians in 1945. Today it is state-owned enterprise AWTOWELO, a source of embarrassment to Stock because it continues to produce the old line of Stock products, creating confusion among customers.

Despite its prosperity under U S management, Stock of Berlin is sitting on a powder keg—and Nikita Khruschchev may have lit the fuse in a recent speech when he threatened to seal West Berlin off from the rest of the world if the German question isn't one day settled in Russia's favor.

City in a turmoil

Russian threats aside, Berlin itself is in a state of economic flux. Until World War II's end the capital of all Germany, Berlin today is the capital of East Germany only—which means that the onetime government workers of what is now West Berlin have either moved on to Bonn, or if they have remained in Berlin have had to seek other forms of employment.

It is this latter group that is pressuring Berlin's Senate to build up the city's industry. In other words, while Berlin is Germany's largest industrial city, the Senate is doing everything it can to make it an even bigger one, so as to compensate for the loss of political jobs which formerly existed there.

This pro-industry slant is, of course, much in Stock's favor. To achieve their goal of a bigger industrial Berlin, West German authorities have set up a three-pronged tax incentive system:

First, there is a 4% tax collected on all industrial products purchased in West Germany—except in West Berlin—all of which is collected by the government of West Germany for the benefit of the city of West Berlin.

This same tax is collected by Stock in all invoices to West Germany, but then the customer himself presents the invoices to the tax office of his city and collects a rebate of 4%. Net effect is that Stock products are marketed in West Germany at 4% off sales price.

20% income tax discount

Second advantage enjoyed by West Berlin industry is a 20% income tax discount, when and if a profit is made (20% more, that is, than industries elsewhere in West Germany), plus a 3.2% corporation tax discount.

Counterbalancing these advantages somewhat is Berlin's fast-increasing manpower shortage, brought on by (1) widespread pirating practices among German firms (2) by an aging population (most young Berliners have been attracted to jobs elsewhere in West Germany), and (3) by constantly increasing East German pressures on "border walkers" (people who live in East Berlin but work in West Berlin).

Labor shortage looms

There are still some 40,000 of the latter, while about 13,600 West Berliners work in East Berlin, which means that if East Germany does crack down on the border walkers, West Berlin will lose more than 25,000 workers in the exchange.

Out of Stock's total workforce of 800, about 12% are border walkers.

In Stock's favor, however (Berlin seems to be a city of "howevers," for every industrial disadvantage there is a counterbalancing advantage and vice versa), is the higher standard of living—said to be 50%—which West Berlin offers over East Berlin, which accounts for the East to West worker movement.

Not only that, the East Berlin border walker can do very well by converting his "West Marks" into "East Marks" on the black market—something like 4 to 1.

Two main divisions

As to its actual physical plant, Stock is located in the south Berlin district of Marienfelde, on a 20-acre plot, 40% of which is in buildings.

Administratively, the company is made up of the Hartex Machine Tool Division, the Metal Cutting Division, and Hartex GmbH, a 100%-owned marketing subsidiary. Top administrator is William B Dustin, formerly superintendent of Union Twist Drill's Canadian Division. Works manager is Herman E Rose, formerly assistant to the works manager at UTD's Athol Division.

The company's Metal Cutting Tool Division at Marienfelde is made up of two drill manufacturing halls, a cutting tool hall, a hardening and heat treating department, maintenance shops, and storage facilities. Transportation of materials and products, incidentally, is all done inside the plant by fork truck, simply because the plant was so badly bombed during the war that what was left of it couldn't be arranged for a continuous flow of materials.

Machine Tool Division

The Machine Tool Division is divided into parts manufacture, parts assembly, and main assembly. Completing the plant layout are a railroad siding, an official truck weighing station, and modern steel testing laboratories. The latter are fully equipped, and meet even high U S standards.

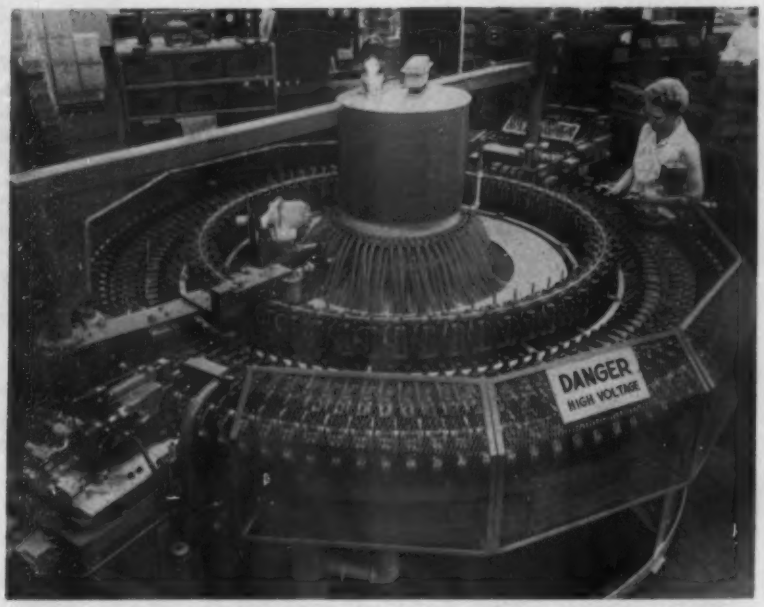
Most of Stock's cutting tool manufacturing equipment is German, but some of it is American, as for instance Jones & Lamson and Ex-Cell-O thread grinding equipment. Special machines for manufacture of cutting tools have been built at the U S plant of Union Twist Drill and shipped in. They are specials for UTD use only and not for sale.

Castings used in Hartex machines are 90% from the Berlin area, with the rest from West Gremany. Most other components are German.

Reds control shipments

The American owners of Stock are constantly reminded that the subsidiary is located in a "free city swimming in a Red Sea." Like those of any other Berlin firm, Stock exports and imports are subject to East German transportation controls. Surrounding East Germany requires that special declarations accompany each shipment in or out of the city. Consumer goods may be ordered and received from Germany in eight days, but *may* is the operating word —Stock and other Berlin companies cannot promise delivery in less than a month, because of the Red's red tape.

But in spite of all the pros and cons of operating on the front line of a cold war, Stock and the Union Twist Drill people are well satisfied with their setup. Sales were so extraordinarily successful last year that groundwork is already being laid to double present production. But if the cold war turns hot? That's anybody's guess.



Automatic testing and calibrating machine processes 480 circuit breakers per hour. Previous manual method gave 700 units per operator per eight-hour shift

Tooling makes calibrator automatic

Designed to calibrate and test circuit breakers, this machine saves space and time—but the devices that make it work offer ideas useful in other automated equipment.

By William M Stocker, Jr, senior associate editor

esidential circuit breakers are big business. At Westinghouse Electric Co, sales of these simple electrical safety devices have jumped in demand a considerable amount in the last several years. Following careful manufacture, careful calibration is essential to proper circuit breaker operation. And, because lives and property depend upon each circuit breaker's reliability, there can be no compromise with performance.

Tests 480 units an hour

Conventionally, circuit breakers are tested and calibrated manually. By the manual test table method an operator can average 700 units per eight-hour shift. Manufacturing engineers at Westinghouse decided that the production demand could be met most effectively with automatic machines. Today, the machines are a reality. Fed by one operator, each will test and calibrate any standard residential circuit breaker Westinghouse produces, at the rate of 480 units per hour. Eventually the machine will be part of a semi-automated line.

Tradenamed "Quick-Lag," these circuit breakers have a dual-trip ping action. They include a magnetic trip and a bi-metallic trip. Thus, the breaker will trip instantly under a heavy overload or it will trip in less than one hour if current persists at 125% over breaker rating.

Principles

A merry-go-round design was used for the automatic machine. At a single station, an operator loads the special fixtures on the rotating table. Unloading is automatic. The table, containing 120 fixtures, completes a full cycle every 15 minutes.

Some circuit breakers use a plug-in, or "stab," connection to the power line while other units are connected with screws. Each fixture on the machine is designed so that a flip-over, or 180° rotation, permits it to accept either stab or screw-connection breakers.

How it works

On the automatic machine, two electrical circuits are used for testing—and the circuit breakers are connected in series. A relay for each fixture takes over when the breaker trips during preheat, to complete the series circuit.

One electrical circuit (fixed time) is used to preheat the bi-metal trip to bring it up to trip temperature. When it reaches this temperature an adjusting screwdriver backs out the calibration screw in the breaker to provide correct engagement at the trip temperature — 125% of rated temperature. Then, after a controlled cooling period lasting approximately one minute, the breaker goes into a second electrical (reconfirm) circuit. This circuit determines how accurately the original calibration was performed (high, low, or correct). Water circulated through each of the fixtures at 90 F keeps their temperature uniform. Otherwise, heat build-up or a cold fixture could adversely affect calibration.

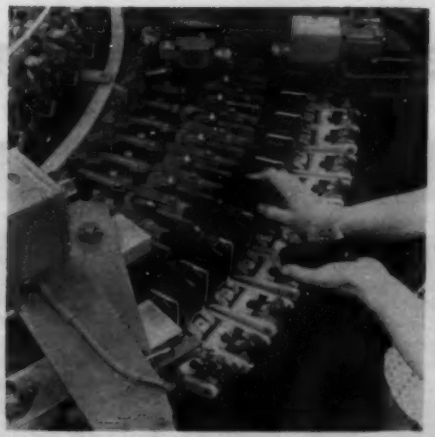
Breakers are loaded with the toggle in the "Off" position. As they leave the loading station for the preheat cycle, a set of rubber-rimmed rollers throws the toggle to "Reset" first and then to "On." The breakers are assembled with the calibrating screw turned all the way in—or in full contact. Then calibration is done by backing out the screw until the breaker trips at the proper overload.

One of the more ingenious mechanisms, and a key part of this machine, is the automatic calibrating screwdriver. This electropneumatic device is a "flying screwdriver" in the sense that the breaker continues to rotate on the merry-go-round as it is adjusted.

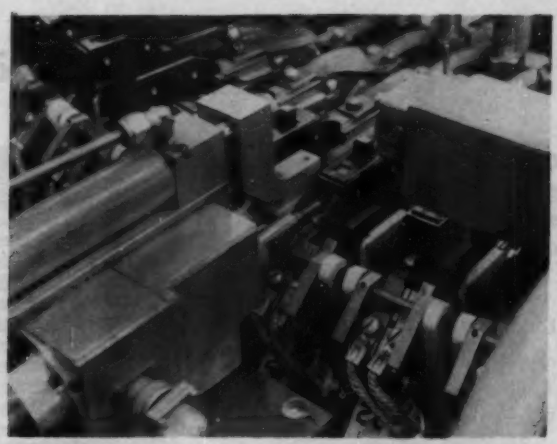
Automatic rejection

At a station just preceding the screwdriver, a probe determines whether or not each breaker has tripped during pre-heat. When a breaker that has tripped reaches the screwdriver, its condition is remembered and the screwdriver retracts to allow the breaker to pass without calibration. (Later it is rejected.)

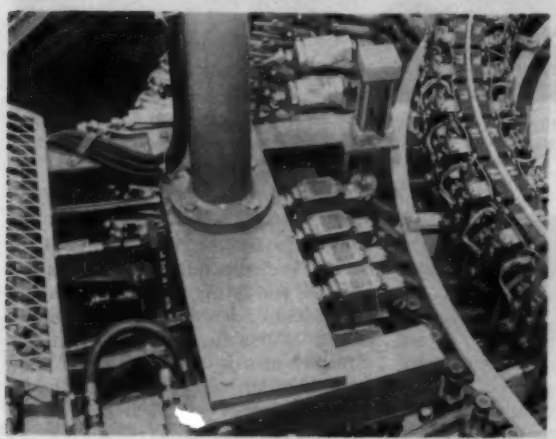
As a good breaker arrives for calibration it moves against a Nylon shoe on the end of an air-actuated



For loading, circuit breakers are placed in fixtures by operator. Toggle switch is in "Off" position. Machine then pushes breaker toggle to "Reset," and then to "On"



Automatic screwdriver does actual calibrating. Electrically driven and air fed, it provides precise adjustment and then retracts. Control remembers, and skips, faulty breakers



Unloading is accomplished by four electropneumatic "hoes" which, according to height of pin determining breaker condition, pull breaker from fixture and into proper chute

Chutes are temporary. Eventually breakers will be shunted directly to conveyors for movement to the repair or packing department

piston. This shoe triggers the advance of the screwdriver and moves forward with it, to align the driver with the calibrating screw and steady the breaker. Then the driver backs out the screw until the breaker trips, at which instant an electric brake stops the driver and it then retracts. If for any reason its function is abnormal—such as no screw in the breaker or a screw jammed too tightly—the screwdriver senses trouble and retracts to clear the breaker.

A steel pin in each fixture is mechanically positioned, by instructions from the relay for each breaker, according to the condition of the circuit breaker in that fixture. Thus, the height of the pin above the fixture shows whether the breaker is good, high, low, or tripped in preheat. As each breaker reaches the end of the table rotation cycle, pin height determines which of four chutes will receive the breaker as it is discharged from the fixture.

Power supply

Current source for this machine's testing functions is a resonant reactance bridge which is independent of the line load. Thus even small changes in load current will not affect calibration and testing. Incoming power is 440 volts with a Variac motor-driven regulator to control line-voltage fluctuations. Step-down transformers convert this power to two 220-volt inputs (preheat and reconfirm) to two multi-tap transformers. Voltage is selectable from 0 to 290 volts. A selector switch provides proper currents for individual breaker ratings and a magnetic-amplifier regulator takes care of fast changes.

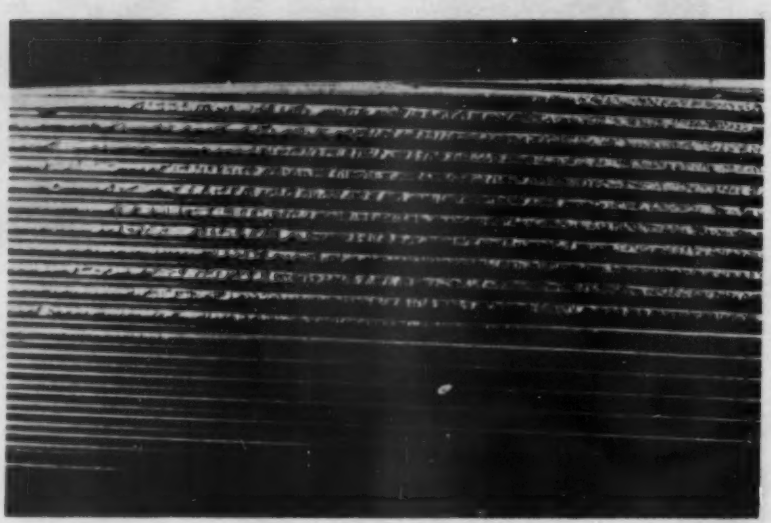
For proper heating, a very good filter is included in the circuit, in addition to the mag amp, to feed clean sine-wave current. A current-sensing transformer constantly senses the load and feeds back to the voltage regulator. Current goes through a commutator and is distributed to the breaker-relay circuit in the table. Selector switches are used to change the current rating.

Manufacturing engineers at Westinghouse spent $50,000 to develop the original calibrating machine—and $75,000 more to build and install each new one. When they started the project, they anticipated a 20% return on the investment. Today they say that the return is substantially higher than 20%. In normal operation, the machine does the work of five people working at full efficiency without stopping.

Specialized heat treating

Controlled-atmosphere furnace gives more latitude in choosing steels for thread rolling and cold forming dies

By Donald F Griffin,
chief metallurgist,
Landis Machine Co,
Waynesboro, Pa



Typical failure—When thread crests of thread rolling dies fail in this manner, die life has been satisfactory

Increased flexibility in our heat-treating department allows us to select die steel according to the individual application. Good die life is insured; die costs are reduced by allowing us to use less expensive steels where practical.

We have six requirements in die materials:

- **Fatigue Resistance**—Normal die failure is due to fatigue failure at the crest of the threads.
- **High Yield Strength**—It is necessary to have high yield strength to prevent deformation in the die threads, especially when rolling hard materials.
- **Wear Resistance**—Where rolling pressure is low and the fatigue limit raised, the crest of the die threads wear and form a nipple-like projection. This reduced section will then, upon further rolling, break off and cause die failure.
- **High Hardness**—The first three desirable characteristics vary directly with the hardness. Thus, high hardness is a prerequisite.
- **Low Movement and Distortion in Hardening**—Whenever practical we thread grind before hardening. This means we are heat treating finished dies and thus movement and distortion must be held to a minimum.
- **Uniform Carbide Distribution**—Dies are produced in sets and should match precisely. Any variation in structure adversely affects response to heat treatment.

Our heat-treating problems are complicated by the wide range of die sizes required. Small dies ¾ to 3 in. in dia are used in our rolling attachments and heads, while our rolling machines may use dies up to 8 in. dia by 8 in. long.

In initial development work many grades and types of die steels were considered. We found that the high-speed steels and the high-carbon, high-chrome the steels come closest to meeting all of the above requirements.

Initially all dies regardless of steel type were treated in salt baths. Examination of test dies over an extended period indicated that we could improve the quality of our high-carbon, high-chrome dies by using some other means of heat treating. The greatest disadvantage in using salt baths for these grades of steel was an intergranular surface attack due to the extended soaking time necessary for proper austenitizing. Short die life resulted when these microscopic cracks enlarged and weakened the thread, causing gross cracking.

Needed New Furnace

Our salt baths are designed and are maintained primarily for the neutral hardening of high-speed steel. Any alteration to adapt them to thread-roll-die treating would interfere with our cutting tool production. Therefore, we asked C I Hayes Co, Cranston, RI, to provide a furnace suitable for our specific needs. Basic requirements were a controlled atmosphere so as to have no surface reactions, suitable temperature range, uniform heating and cooling zones to minimize movement and distortion, and flexibility to take care of dies ranging from ¾ to 8 in. in diameter.

Against these requirements, C I Hayes recommended their Ampro process, consisting of an atmosphere of dissociated ammonia (with gas addition) and a furnace to consist essentially of a preheat chamber, high heat chamber, and two cooling chambers, all under atmosphere.

Scale-Free Work

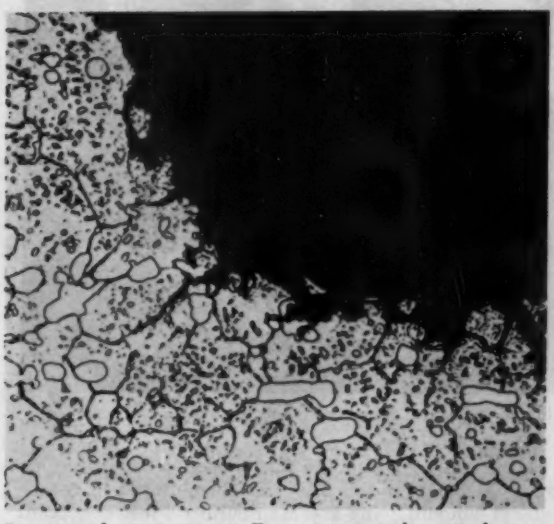
For atmosphere generation a Hayes dissociator was purchased as an integral part of the furnace, capable of working on either liquid ammonia or ammonia vapor. Actual atmosphere generated is 75% hydrogen and 25% nitrogen and carries a dew point of approximately –60° F. Original test samples and subsequent dies showed that this amosphere gave us a clean, bright, scale-free surface with no intergranular attack.

Our full heat-treating schedule is:

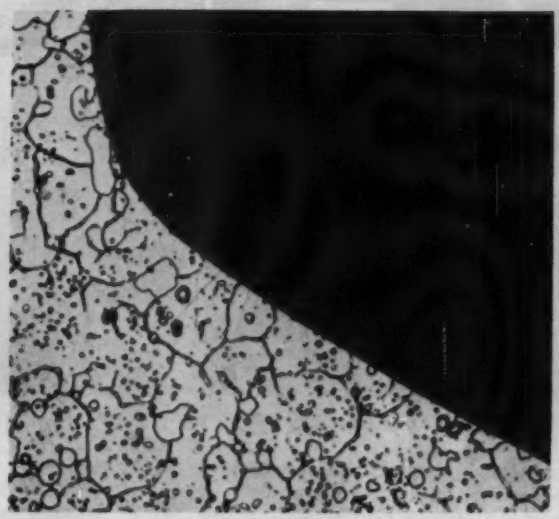
1. Preheat (temperature is varied depending upon grade of steel and die size).
2. Austenitize at 1850 F.
3. Cool under atmosphere.
4. Refrigerate at –120 F.
5. Double temper to desired hardness.

The successful heat treatment of thread-roll dies made from high-carbon, high-chrome steel requires deep freezing or sub cooling as an integral part of the process. The essential part of the hardening reaction

reduces tool costs



Improper heat treatment—Deep intergranular attack may take place on thread root of a high-carbon, high-chromium thread roll that is heat treated in salt

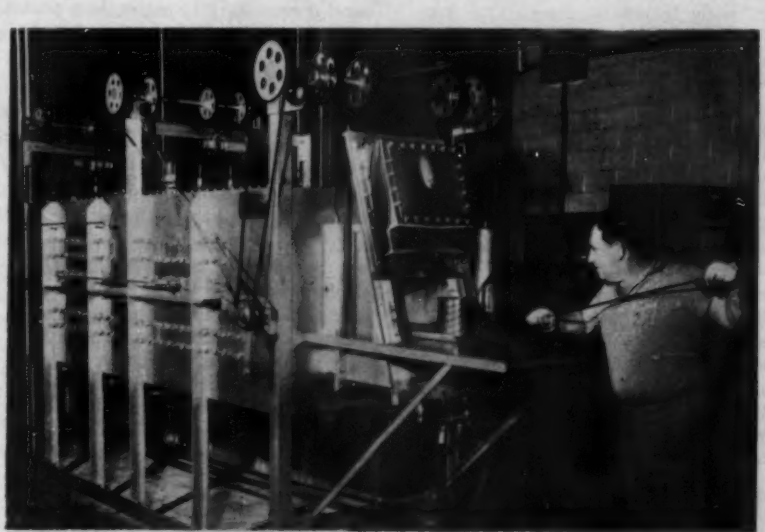


No surface attack—Die treated in dissociated-ammonia atmosphere shows no surface attack, thus eliminating stress risers that weaken the thread

is the transformation of austenite to martensite upon cooling. However, high-carbon, high-chrome steel as hardened consists of retained austenite and martensite instead of 100% martensite. It is desirable to have a totally martensitic structure for two reasons. First, retained austenite will transform to untempered or stressed martensite through physical working, thus lowering toughness. Secondly, this transformation (retained austenite to martensite) is always accompanied by a size change resulting in increased part size.

Sub-Zero Treatment

Tempering is successful in eliminating this condition but only if temperatures of 900F and higher are used. With high-carbon, high-chrome steels, these high tempering temperatures would give us too low a hardness. Thus, it is necessary to include a refrigeration cycle in our heat treatment. Sub-zero cooling reduces the amount of retained austenite and stabilizes that which is not transformed. Production has been excellent. In comparison with our old method using salt baths, we thought that the actual number of dies per working day would be less; however, due to the rapid response of the furnace, the large heating chambers and the ability to schedule work without interference, production has been increased. For example, on dies



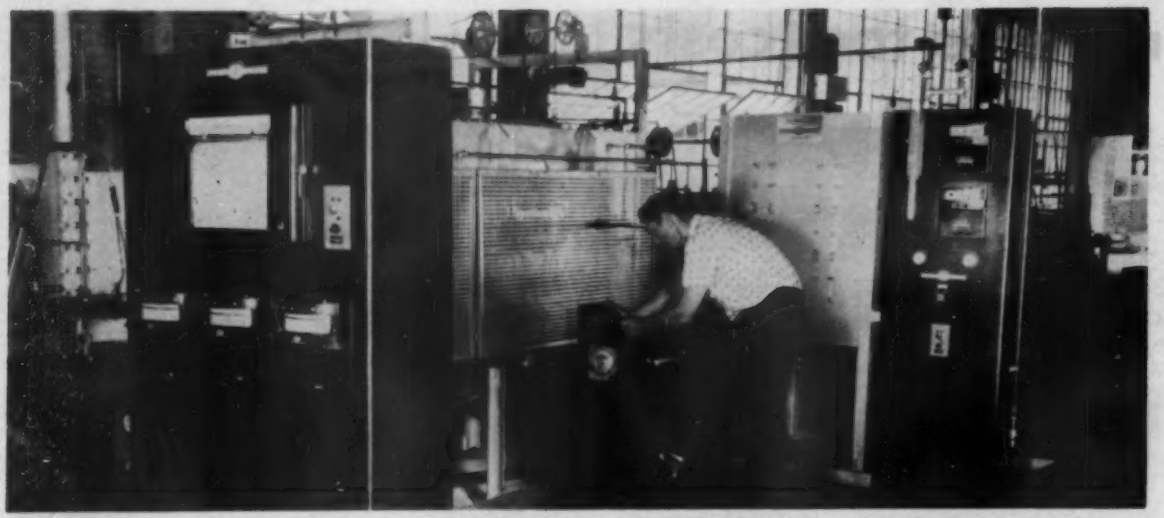
Big dies too—A straightening die 7 x 7 in. is being loaded into preheat chamber of controlled-atmosphere furnace. A small dolly inserted in center groove of floor tile aids movement of heavy die from chamber to chamber

4½ in. dia by 2 in. thick, we have reduced hardening time 45%. If necessary, furnace load could be increased by double decking the dies, i.e. placing dies on trays in stacks.

In addition to dies of superior quality, use of this specially designed furnace has resulted in other intangible benefits. We have been able to release our salt-bath furnaces for full-time operation on high-speed steel. This has eliminated the need to work overtime or to go to a two-shift operation. Also we have been able to speed up delivery as there is no delay for other work.

Furnace construction

The furnace chambers were arranged in line and incorporated a



Dewpoint check—Several times daily the foreman checks dewpoint in the high-heat chamber of the furnace

preheat, high heat, and two cooling chambers, all under atmosphere, to provide uniform heating and cooling so as to minimize distortion and movement. The preheat and high-heat chambers are 18 in. high by 24 in. wide by 36 in. long. The first-stage cooling chamber is 24 in. long and the second-stage cooling chamber is 36 in. long. Effective space permits a die size of 12 in. wide by 9 in. high by 30 in. long.

The furnace zones or chambers are separated from each other by insulated door located in a throat area 12 in. long between the zones. Doors are operated vertically through an overhead counterweighted mechanism (manually operated) that lifts the door by rods through special hydrogen seals. The front and rear external doors are of the sloping sliding type which upon opening actuates a gas-curtain flame, to prevent the entry of air into the furnace.

Operating Temperatures

Heating is through nickel-chrome elements, nine in the preheat and nine in the high heat, to give a maximum continuous operating temperature of 2100 F. The cooling chambers are water cooled and are maintained at 150 F (first stage) and 100 F (second stage).

Atmosphere inlets are located in the cooling section and in the preheat and high-heat sections. The inlets in the heating sections consist of a manifold located on both sides of the chamber, each manifold having four inlets. The proportion of atmosphere flowing to each chamber can be controlled to obtain best results. We divert 66% to the cooling section mainly to obtain a bright finish because the slightest amount of air will discolor the work. With the cooling chambers being adjacent to the rear external door, we have found it necessary to maintain a positive outward pressure to exclude all air.

How Trays Are Moved

All dies within the furnace are moved manually. Due to the variety of sizes, and resultant variety of time cycles, any automatic conveyor mechanism would have been unduly bulky and complicated. With manual operation, however, another problem arose as to how to move trays of dies from chamber to chamber when the furnace was fully loaded. This was overcome by designing the floor tile with a center groove 2½ in. wide by ½ in. deep, along which a hooked rod can be passed beneath the trays to select the one we desire to advance. The non-scaling atmosphere and use of stainless steel for trays eliminates the sticking usually encountered in hardening furnaces. For those dies which are too heavy to move by pushing, a small dolly is inserted in the tile groove and when under the correct die, elevated so as to lift the tray and die off the furnace floor. Elevation is obtained quickly by use of an extension rod attached to a double-lead thread on the dolly. Dies weighing 65 to 75 lb are easily moved when the tray is raised ⅛ to ¼ in. off the floor.

Initial start-up of the furnace was simple and without complications. Notwithstanding the lack of a muffle and the fairly open construction, no difficulty was encountered in reaching and maintaining a low dew point in the high-heat chamber.

Prior to admitting atmosphere for the first time, the furnace was dried out for five days. Within two hours of gas entry (400 CFH dissociated ammonia plus 25 CFH natural gas) dew point was down to –5° F from 72 F. No difficulty was encountered in obtaining –40 F. dew point at an operating temperature of 1850F. This dew point has been maintained since start-up.

Standard operating procedure is to use 370 CFH dissociated ammonia plus 2 to 5 CFH natural gas while heat treating. Initially during idle periods, overnight and on weekends, the furnace was completely shut off with a consequent loss of 4 to 5 working hours the next day while we obtained the necessary low dew point. This has been overcome by idling at a temperature of 1500 F. with a gas flow of 25 CFH, no natural gas.

Quality Justifies Cost

The cost of the raw ammonia needed to give 370 CFH of dissociated ammonia is approximately $1.00 per hr. This is based on bulk anhydrous ammonia at $0.12 per lb., 1 lb of ammonia yielding 45 cu ft of the mixed gas consisting of 75% hydrogen and 25% nitrogen. In comparison with other generated atmospheres such as an endothermic atmosphere, an ammonia atmosphere is five to ten times higher in cost. We feel that this is justified through the improvement in die quality that we have realized.

Report from Detroit:

Auto Lines Retool for the Compacts

US car buyers have shifted in their preference for workaday road transportation, and this shift has produced a strong effect on automotive production lines. Most of the compact cars are not basically different from standard-size autos—though all but one of the new-size machines are unit-body designs. However, the emphasis is definitely on the compacts, and many of the newer car-construction concepts are being carried out on the compacts.

In the General Motors line—the Buick "Special," the Oldsmobile "F-85," and the definitely advanced Pontiac "Tempest"—for example, there is a new small V-8 aluminum engine built by Buick for itself and for Oldsmobile, and as an option for Pontiac. Oldsmobile carries on the corporate effort by producing suspension-system parts for Buick and gear forgings for Pontiac. And Pontiac makes differential parts for Olds.

The new Tempest engine, a 45° slanted four-cylinder unit based on the larger Pontiac V-8, is produced on the regular V-8 line (for standard-size Pontiacs) by closing off tooling that would normally work on the missing bank of cylinders.

American Motors has come up with the first production die-cast aluminum engine block—which is actually produced at the Doehler-Jarvis plant. It has six cast-iron cylinder liners and two CI bearing inserts that are included in the aluminum die casting.

To round out the Detroit '61 picture, we include in the following pages production stories based on Buick tooling for the small V-8, Oldsmobile underwater machining on engine parts, Pontiac production of the 4-cylinder engine and its flexible transaxle shaft, and AMC tooling for the die-cast block. In addition, there is one story based on luxury cars —covering materials handling that helps turn out frame rings for Chrysler and Imperial starter motors.

Buick "Special"—a new small V-8 p 110

Oldsmobile "F-85"—suspension and gears p 113

Pontiac "Tempest"—rugged 4-cylinder engine p 116

Chrysler—no compact, but the latest handling p 120

Rambler "Classic Six"—a die-cast aluminum 6 p 123

American Machinist / *Metalworking Manufacturing*

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Higher speeds . . . Increased feeds . . . Sublands, and . . . Gun drills . . .

. . . Machine aluminum

New Buick "Specials," like the F-85's and "Tempests" are built on 112-in. wheelbase with unitized body construction. The aluminum engine has 155 hp at 4800 rpm, acceleration will be about zero to 60 mph in 12.5 seconds. Highway gasoline consumption will run about 25 mpg

By George DeGroat, Detroit editor

Buick's '61 compact car presented a number of production problems—especially where the new V-8 aluminum engine is concerned. Among departures from ordinary practice: impregnating blocks and heads to prevent leaks, sharper and more accurately ground cutting tools, plenty of coolant to flush chips away, and harder grades of carbide

Brand-new problems faced manufacturing engineers at Buick Motor Div GMC when it was decided to put an aluminum engine in its new "Special"—the small Buick for 1961. The engine is the first aluminum water cooled V-8 in the U S market (Corvair's 6-cylinder aluminum engine is air cooled and is of entirely different construction), and weighs only 65% as much as it would in CI. Both the block and head for Buick's new engine are cast at the Central Foundry division by a permanent-mold

Milling aluminum blocks starts processing on the 1060-ft block line instead of broaching, as is the case with CI blocks. Reason for milling aluminum is to avoid the heavier cuts normally used on CI. Here pan-rail faces are milled after qualifying the blocks in a Wilson Engineering setup that automatically checks 30 different points (such as the top and bottom) with the bore, and locating holes

Automatic assembly of bushings in camshaft bearings is handled by this Detroit Broach and Machine unit. The operation follows rough and semi-finish machining of crankshaft bearings in a new Natco "Holeway" machine, which also machines oil-packing grooves, finishes the center main bearing, and finishes the starter hole

engines for Buick's "Special"

process where disposable sand cores form water-jacket cavities. Cast-iron sleeves are cast in place to form cylinder walls in the block, and a steel bushing is pressed in a drilled and bored locating hole at each end of the block to provide accurate manufacturing reference points. The cylinder heads use CI valve-stem guides pressed in place and sintered-iron valve seats assembled by means of a shrink fit.

Impregnation stops leaks

These silicon-aluminum blocks and heads are somewhat more porous than CI parts, so impregnation is necessary to prevent leaks in the oil galley, water jacket, and similar areas. A number of leak tests are run on both parts during processing. The block line, for example, has three Centri-Spray washing and air-operated leak-test stations. The importance of removing aluminum chips—which tend to pile up and stick to tools more than CI chips do—makes the block line somewhat longer than it would be for machining CI. Extra probe and chip-blowout stations account for the increased length.

Speeds and feeds in general are two to three times greater than those used in cutting CI, although each operation is examined in light of its own characteristics. For example, where stresses and distortion must be avoided and where interrupted cuts are necessary, or where the structure of the part requires special care, speeds and feeds are comparable to those used for CI. Of course speeds and feeds are a compromise between these two extremes in operations where both CI and aluminum are machined at once, as in machining blocks assembled with CI main-bearing caps. In all cases, however, machining aluminum differs from conventional practice of cutting CI dry in that a rich flood of coolant is needed to remove chips and to dissipate heat. Although this is not too great a problem in turning or milling, getting rid of tenacious aluminum chips is especially important in drilling and tapping operations. Among the most successful tools in this respect on both the block and head lines are Hanson-Whitney spiral flute taps. Higher-than-usual tapping speeds are possible with these tools, and chip removal is no problem.

Gun-drilling and gun-boring tools with high-pressure oil coolant are also used more widely here than they are on CI lines. A typical application on the block line involves Eldorado gun-drilling equipment on a Footburt machine where two oil galley holes 19 in. deep by 0.437 in. in diameter are drilled from both ends. At the same setup, a ⅜-in. hole 10 in. deep is also gun drilled in the block. Valve-lifter holes in the block are gun drilled and then gun bored. This is done not so much for straightness, since these holes are only 1¾ in. deep, but to produce a high surface finish and maintain a high degree of hole-size accuracy. The 16 valve-lifter holes (eight on each side of the block) are produced on a Greenlee transfer machine that processes four at a time on each side and then indexes the work to drill and bore the next four. In CI blocks this work requires five operations—two drill and three reamer passes per hole—but only one drill and one boring operation per hole is needed with the gun tools.

Subland tools are also used extensively on aluminum head and block lines—principally for cutting efficiency rather than to conserve machining

A rebuilt Ex-Cell-O machine bores CI and aluminum crankshaft bearings at speeds and feeds somewhat below those for machining aluminum alone but above those normal for CI

Rebuilt crankshaft lathes were converted from double-end to center drive for easier and more accurate work locating. Three of these Wickes lathes handle the production volume required for the new Buick "Special"

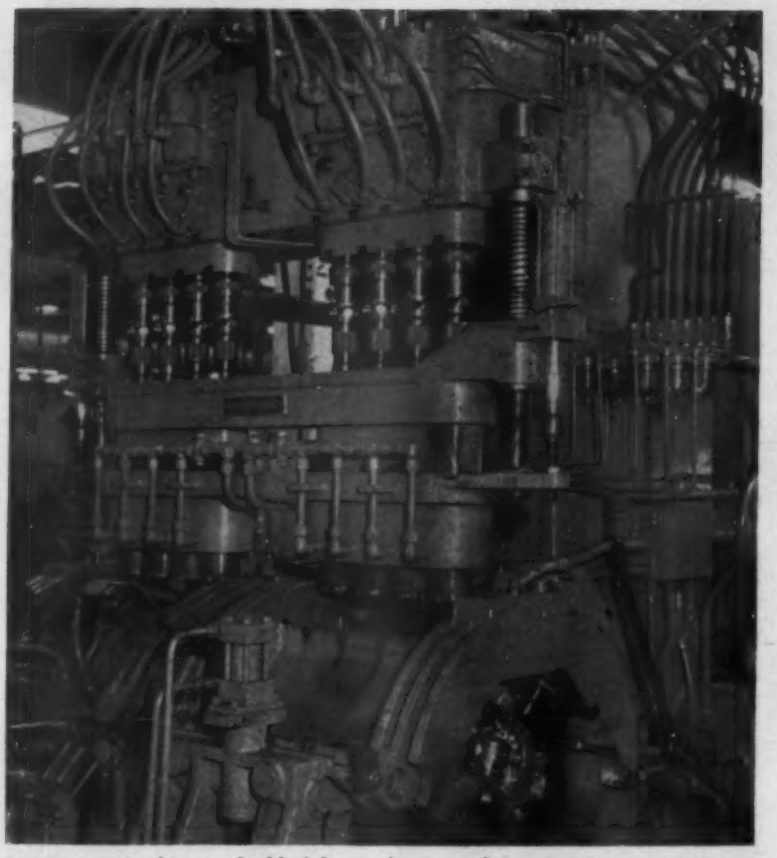
heads. Transfer machines equipped with these tools on the block line include a rebuilt Greenlee—where valve-guide holes are drilled and chamfered—and a rebuilt Footburt that produces dip-stick holes, bolt holes and main-bearing holes, among others.

Other considerations in tooling up for the aluminum engine include grinding all cutting tools to closer tolerances than are needed in machining CI. Sharper tool geometry, increased clearance angles, smaller radii, and polished tap and drill flutes are necessary. Harder grades of carbide are used, too. Where CI might be machined with Carboloy grade 860, for example, Buick is using grade 905 on silicon aluminum. Even harder grades such as Carboloy 999 might be applied for light finishing cuts. On the other hand, they have found compromises necessary in some operations to strike a balance between long tool life and cutting efficiency. In such cases, one of the tough rather than especially hard grades of carbide is used.

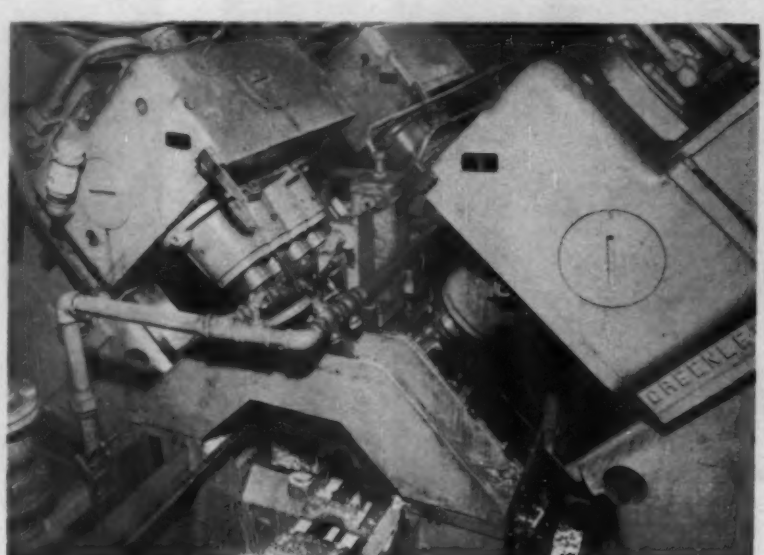
Special tools

Among special tools under development for machining aluminum is a 13⅝-in.-dia Heald milling cutter with 18 carbide inserted blades that can be pre-set within 0.0002 to 0.0003 in., and then adjusted within 0.0001 in. at the machine. Final settings are made by simply turning a jackscrew at each blade while a tenth indicator checks the blade position as it moves. Each blade is locked in its final position by a setscrew. Plans are to use these tools on a Heald machine designed to mill valve-body faces on transmission cases.

Additional machining lines installed at Buick for the new engine include a block line; a head line; reworked camshaft machines; one for machining new cast-malleable-iron crankshafts; new right and left-hand exhaust manifold equipment; a front-cover line; connecting-rod and bearing-cap machines; a group of three new machines for intake manifolds; new equipment for machining aluminum rocker arms, and 10 new hot test stand. The equipment that previously machined aluminum pistons now makes the new-size pistons with adjusted settings, stroke adjustments, and other changes. Nearly three-quarters of the machines added to Buick's manufacturing facilities for the new engine were rebuilt.



Another new machine on the block line is this Barnesdril unit with a rotating fixture for honing cylinder bores vertically rather than on an angle. Bores are finished to about 30 micro-in. rms, allowing sufficient roughness to permit rings to seat themselves



Sublands are used extensively on the block line. In this Greenlee transfer machine they drill and chamfer valve-guide holes at speeds and feeds far above those used with conventional tools on CI

Floods of coolant . . .

Sharp tools . . .

High speeds and feeds . . .

Oldsmobile machines aluminum for F-85 engines

Oldsmobile F-85 is a six-passenger, 112-in.-wheelbase car with 155-hp aluminum V-8 engine. The 215-cu-in. power plant with dual-throat carburetor and a compression ratio of 8.75 to 1 operates efficiently on regular-grade gasoline. Both heads and blocks are made by combining permanent-mold with expendable-sand-core casting. Blocks are machined at Buick Motor division and heads on a new automated line at Oldsmobile

By George DeGroat, Detroit editor

Aluminum heads for the V-8 "Rockette" engine are built on a new automated line at Oldsmobile's Lansing plant. Most important features are floods of coolant that remove sticky aluminum chips, and the higher cutting speeds applied in selected operations.

Machining under water is a fairly accurate description of the work at Oldsmobile Division of GMC, where aluminum heads for the new 155-hp F-85 Rockette engines are built. Tons of coolant inundate cutting tools, the work, clamps, and even transfer rails in flushing sticky aluminum chips away. All this is a new experience to auto builders long used to machining CI dry. One of the first problems encountered in machining 356-aluminum-alloy heads was that of getting rid of sticky chips. Result is a coolant system of 3000-gpm capacity, with 60% of the volume used for flushing chips into a 35,000-gal "dirty" tank. After chips settle out, the coolant passes into Hydromation units where cloth filters remove the last vestige of foreign matter before the coolant enters a 6000-gal "clean" tank for return to the line.

As far as part geometry goes, the new heads are similar in design to the CI heads in the familiar V-8 Rocket engines; but here the similarity ends. The new heads weigh only 18 lb as compared with about 60 lb if they were made of CI. And the 356-aluminum-alloy heads are precipitation age heat treated (T-5 condition) for maximum dimensional stability. This makes it a tough, stringy material, difficult to cut.

Tool geometry changed

Cutting-tool geometry had to be carefully analyzed and new designs put into the production line. Much sharper shear angles on cutting tools with significantly higher speeds and feeds than are used on CI are required. Clearance angles on conventional drills run from a minimum of 15° to 18° as compared with the usual 12°. Webs have been thinned and lands are reduced. Heels are rolled over slightly to widen the flutes for better chip passage. Drilling speeds are up to 150 sfm.

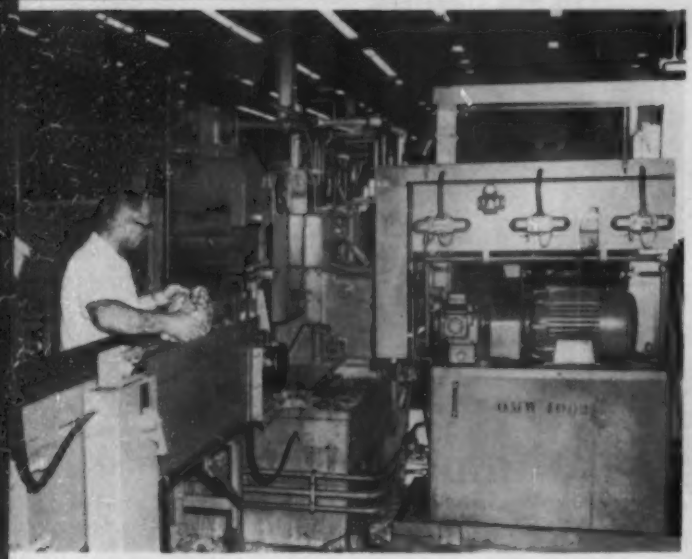
Carbide in milling cutters is grade C-2 and here, too, clearance angles are high—about 7° to 10°. Rake angles are 10° on some tools, with 15° axial rake and 18° radial rake on others. These rake angles are 30° and zero, respectively, for still other cutters. High-spiral flutes promote free cutting and fast chip removal.

Biggest problem in machining the new heads is the tough burrs produced in all cutting operations. To overcome this, a mechanical deburring setup is included on the line.

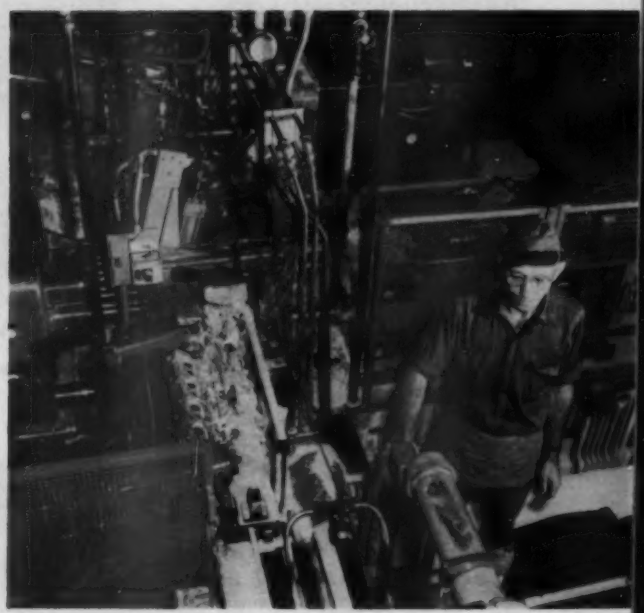
The 400-ft head line has entirely new machines with one exception. This is a WF and John Barnes machine rebuilt by F Joseph Lamb Co. Operations start with a 7-station Snyder transfer machine and a single-station Snyder machine where the four sides of the head are milled. This involves milling the cover face, exhaust and bolt bosses, the joint face, and the intake-manifold face at cutting speeds of 2075 sfm and feed rates of 160 to 175 ipm.

Two Footburt transfer machines follow. The first is a 13-station unit in which every other station is idle

Report from Detroit . . .



Two Snyder machines start machining operations on the head line. Qualified castings—machined across the valve cover and exhaust and intake manifold faces at the foundry—enter these machines for all major milling operations



Canvas splash guards absorb heavy coolant spray on this Footburt machine where most drilling, reaming, tapping, counterboring, and similar operations are performed. Coolant is 10-to-1 "Solvac" WA-159 chlorinated water-soluble solution delivered at 3000 gpm

to facilitate tool changing, maintenance, and for general accessibility to the heads, spindles, and fixtures. Nearly all the drilled, reamed, and tapped holes required in the head are produced here, in addition to six end pads milled at a speed of 1040 sfm and a feed of 80 ipm. Subland tools drill and countersink holes wherever practicable.

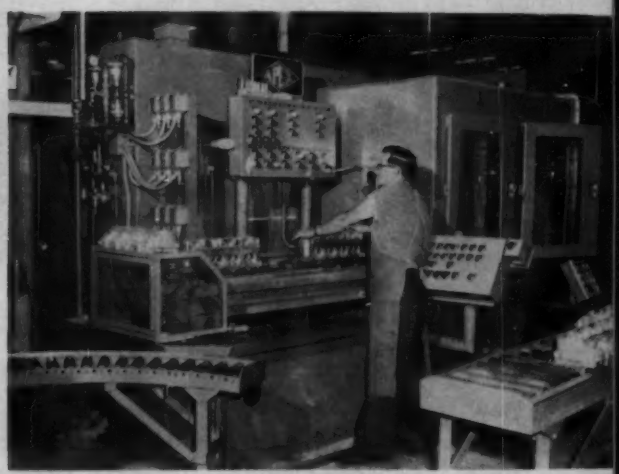
The second Footburt is a 17-station machine also—laid out with every other station idle. An automatic fixture at the start of this machine tips the head at a 14° angle to position the valve-guide holes horizontally with respect to drilling, counterboring, and reaming tools. Spotfacing, counterboring, chamfering, trepanning, reaming, and tapping operations that follow complete the work done in this machine.

Next operation is washing in a Centri-Spray machine, followed by a Beach air-testing unit that checks the heads for leaks. Leaky heads are delivered to a special Apex automatic sealing machine that blows sodium silicate under 100 psi into the faulty parts. Another air test follows, and properly sealed heads continue along the line.

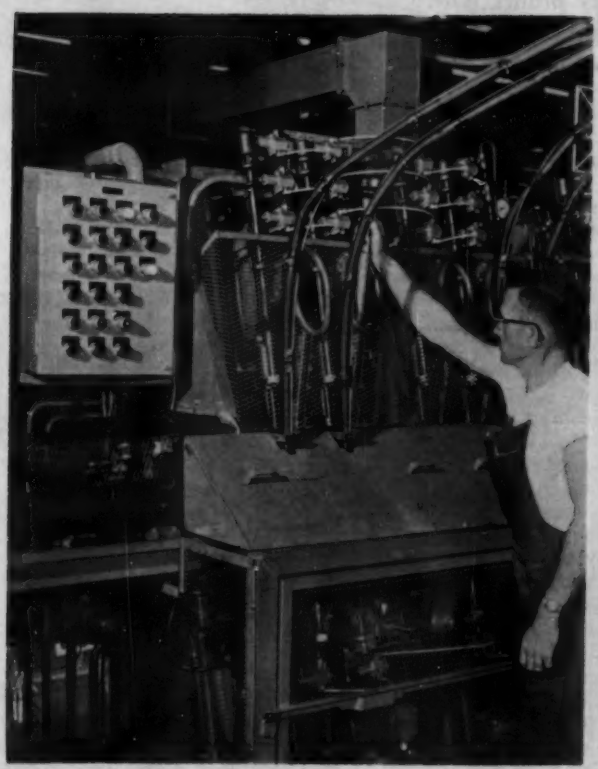
A Parker & Sons machine especially built for the purpose presses CI valve guides and valve-guide inserts into the aluminum head—another operation not encountered with CI heads. A press fit eliminates the expansion and contraction that would occur if the heads were heated for shrink-fits. Results are uniform because there are no variations in the pressure applied.

Gunboring the CI valve guides and plunge cutting the valve seats come next in the rebuilt 14-station W F and John Barnes machine. Exhaust and intake holes are tapped here, too, among other drilling, tapping, and deburring operations. Final operations on the aluminum heads are finish-milling the joint face in a 5-station Snyder machine, mechanical deburring, and washing.

Air testing the relatively porous aluminum heads checks combustion and waterjacket chambers for leaks. A test cycle of 28 seconds determines whether or not the parts need to be sealed against leaks



A 10-station, double-indexing automatic Apex machine seals heads with sodium silicate at 100 psi. Parts transfer from the Beach machine on powered rollers and return after sealing



Automatic installation of CI valve guides and inserts is handled by this 7-station Parker machine. Two Syntron vibratory hopper feeders deliver two guides at a time to the top of each fixture, while inserts are also fed two-at-a-time through magazine-loaded feeders at the bottom. Result is simultaneous installation of two guides and two inserts in heads at each of four working stations

High-spiral taps and special cutters in this rebuilt W F and John Barnes machine are ground as accurately as possible with geometry designed to produce minimum thrust loads

Report from Detroit . . .

Lock-out tools . . . Tripping "ears" . . . Fast changeover . . .

V-8 line produces

Pontiac's "Tempest," with wide track wheels, independent four-wheel suspension, and unit body construction, has a 4-cylinder, 125-hp engine connected to the first American rear-mounted transmission by means of a flexible propeller shaft. The 195-cu-in. engine has 4 1/16-in. cylinder bores and 3¾-in. stroke—the same as used in Pontiac's big V-8 engine

By George DeGroat, Detroit editor

New tooling at Pontiac has been added to an existing V-8 engine line to allow machining regular power plants with full tooling, or single-bank "Tempest" engines with tooling on one side. Special equipment produces the flexible propeller shaft that drives the first US-car transaxle.

Pontiac is introducing its brand-new 195-cu-in. L-head, 4-cylinder engine for the "Tempest" without adding new lines (or even very many new machines) to engine-plant facilities. Common parts are the secret. Cylinder heads for the new engine are the same as those in Pontiac's big V-8 engines, and are made on four existing lines. The same goes for other components such as pistons, main bearings, connecting rods, hydraulic valve lifters, ball studs, and timing gear chain covers.

Of course, crankshafts, camshafts, flywheels, and manifolds are among the parts that necessarily differ, but even here no great amount of new equipment is required. In most instances, the addition of new tools or modified fixtures on existing machines accommodated these parts.

4's and 8's

One of two block lines now runs 4-cylinder blocks as well as V-8 blocks, both the same length. The new block resembles one-half a V-8 block cut axially and is cast with special "ears" for manufacturing and handling purposes throughout the line. About half the transfer bars throughout the line were redesigned to accommodate the new blocks, as were clamping and positioning devices. Several stations were added to perform operations not required on V-8 blocks. In some stations tools are simply added or removed to suit the type of block to be machined.

Identical cylinder-bore sizes and 45° incline on both types permit running the new blocks through rough boring, finishing, and honing machines without tool changes. Only one bank of heads, of course, is used on these machines. A cast boss on the block deactivates the unnecessary bank of heads by tripping appropriate limit switches during transfer movement. Another such application of part geometry in controlling machines is on a Greenlee transfer machine with two opposed banks of angular heads that ream valve lifter holes, drill cylinder head bolt holes, and for drill tappet holes. Here, too, only one bank of heads is used for 4-cylinder blocks. In other instances machine heads are actuated rather than shut down by the cast boss.

One additional head is installed at an Ingersoll machine where a starter-mounting bracket is milled at one end of the 4-cylinder block. And extra stations were installed on a Greenlee machine for drilling and tapping generator-bracket holes and intake-manifold support holes among others. When V-8 blocks go through the line, these extra heads are automatically deactivated or the cutting tools are previously removed. In some cases, part geometry is such that tools for the 4-cylinder block "cut air" when V-8 blocks go through. For example, four milling cutters at one station on an Ingersoll machine machine the valve-chamber cover rail on the new block. However, spacing between the cutters is such that only two cutters engage the V-8 blocks.

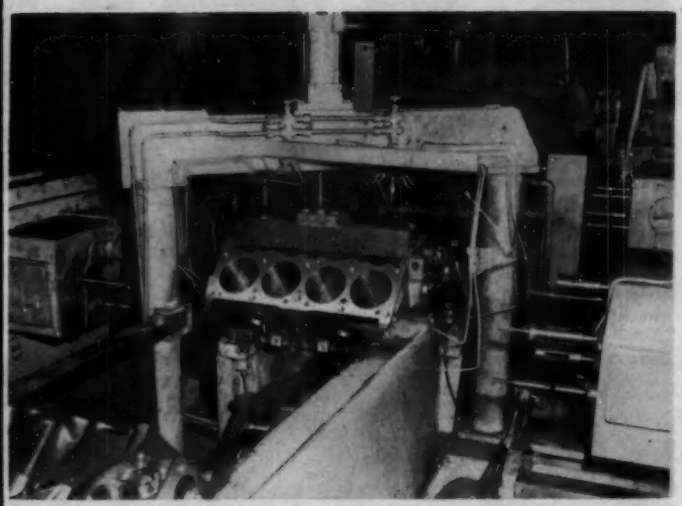
Production schedules call for an economical quantity of one block or the other in a run before changing over. Only a negligible amount of time is required for the change, however, and tools can be removed or added along the line as needed.

Prop-shaft production

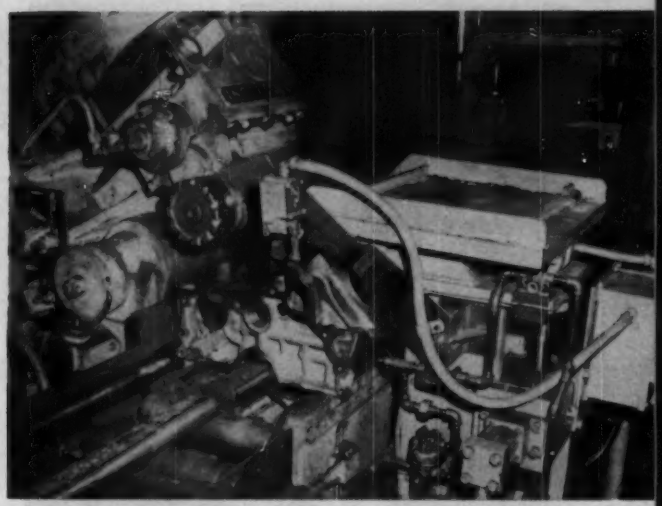
A group of existing machines was modified and rebuilt to produce the new flexible propeller shaft. This is an SAE-8660 steel forging only ⅝ in. in dia and nearly four feet long to connect the front-mounted engine to the rear-mounted transmission. It is heat treated and shot peened for high fatigue life so it can flex to the curve that virtually eleminates floor hump.

In the car, the shaft is housed in a curved torque tube of hat-sectioned

4-cylinder "Tempest" engines



Added head (at left) on this V-8 block line was installed for tapping 4-cylinder engines. Head at right, for tapping the V-8 block, has had tools for tapping 4-cylinder blocks removed. Deactivation of head at left is simply a matter of throwing a switch at the control panel when 8's are scheduled



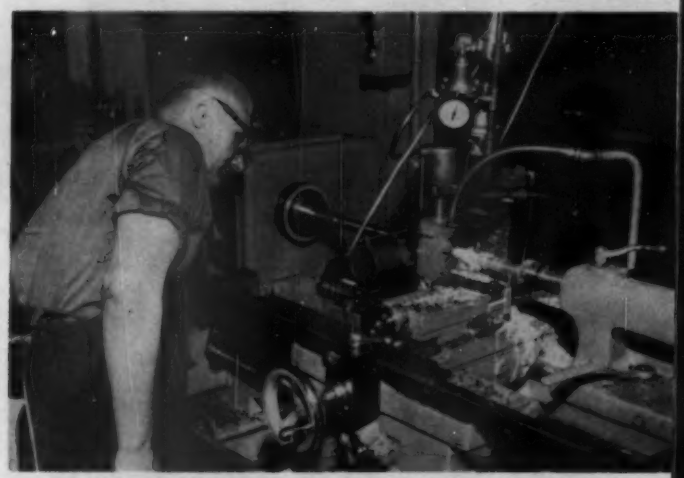
A cast lug on the 4-cylinder blocks activates this added milling head on an Ingersoll machine. Operation is milling the starter-mount hole in a cast bracket on the 4-cylinder block. The limit switch engaged by the 4-cylinder block to operate this head is not tripped when V-8 blocks go through the line

Only one bank of angular honing heads is in operation on this Micromatic machine when 4-cylinder blocks are in the line. Cast lug to activate additional heads elsewhere also trips a limit switch here to shut down the bank on the left

Spline rolling long flexible prop shafts requires a special supporting fixture on this Roto-Flo machine. Spline has 24 teeth, 30° pressure angle, and a 32/64 diametral pitch. Involute profile error is plus 0.002-in., minus 0.0004. OD before rolling is 0.7440-0.7425 in. and is 0.7920-0.7913 in. afterward

Finish grinding the prop-shaft pilot diameter to 1.3771-1.3761 in. and the 2.78-in.-dia flange face to a width of 0.400-0.420 in. is accomplished with a 30-in.-dia contour-dressed 60-K-grit wheel in this Landis machine. Shafts are supported on six roller rests while the end to be worked is held in a 3-jaw chuck

Belt grinding roughs and finishes prop shafts because of great length-to-diameter ratio. In this finishing setup, a 150-grit aluminum-oxide belt runs at 3500 sfm to produce a maximum surface finish of 50 microinches, rms. Starting with a 0.665-in. OD, finished dimensions are 0.649-0.651 in. OD plus a 0.50-in. radius at the flange end and a 1.500-in. radius at the bearing end. An automatic feed carries the work past the belt twice for a 2½-minute grinding cycle



Centerless ground tubes are profiled, turned on the OD, and grooved in this 15-in. LeBlond engine lathe equipped with a Karge tracer attachment. The AISI-C1041 steel tubing is heat treated to 30-34 R_c before turning at 0.0095-ipr feed and a speed of 93 rpm. Here Valenite throwaway carbide insert tools with built-in chip breakers are set up with a negative rake

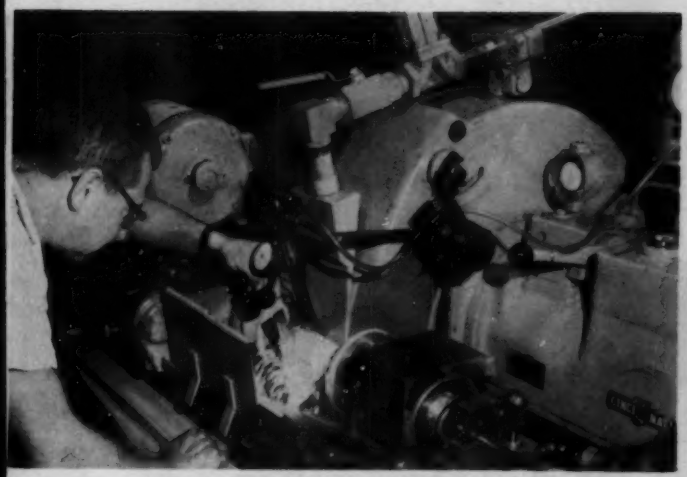
heavy gage steel that rigidly joins the engine and transmission. This housing also serves to support prop-shaft bearings and divorces engine-torque reaction from engine mounts.

Upset at both ends when received, the forged shafts are cycle annealed, straightened within 0.010-in. tir on a special Industrial Metal Products Co machine and then cut to length in initial operations. Two new Production Machine Co belt grinders remove 0.060 in. from the center section in rough grinding, after which the shafts are straightened again and go into special Seneca Falls Lo-Swing tracer lathes for turning the flange end and pilot OD. One end is centered, the bearing diameter is turned, and a radius is produced in a Pratt & Whitney engine lathe modified to suit this part. This work is followed by roll flowing a spline on one end of the shaft in a Michigan Tool Co Roto-Flo machine. Hardening, quenching, and drawing in a special Gogan machine is next, and then the shafts are straightened for the third time in a specially built Pontiac setup.

Finish grinding the center section follows—in two more new Production Machine belt grinders. Final operations include 100% Magnaflux inspection for defects and cracks, shot peening in a Pangborn unit, a fourth straightening operation, finish grinding the pilot and flange faces in a new Landis machine, and grinding the bearing diameter in a new Cincinnati grinder.

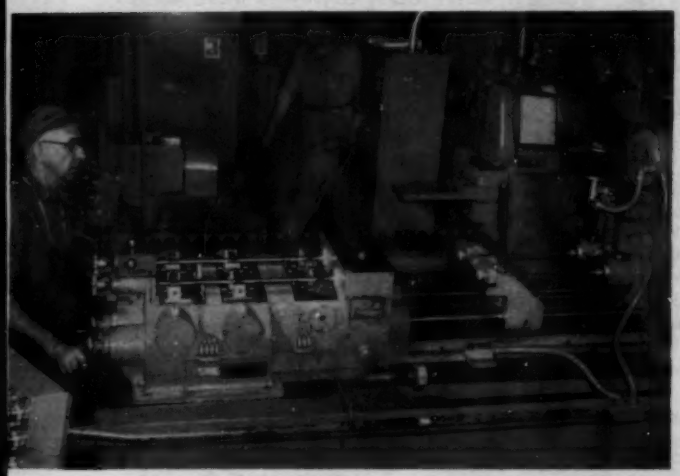
Transaxle parts

Among the most interesting of new machines bought for processing

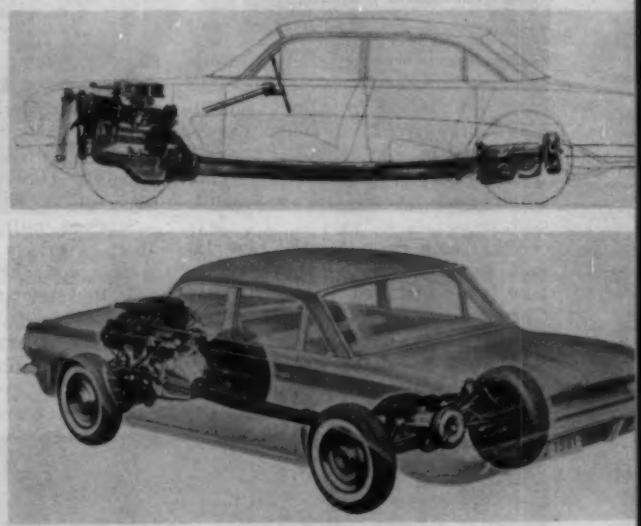


A surface finish of about 10 microinches, rms, is produced on this Cincinnati machine in grinding the prop-shaft bearing diameter to 0.8718-0.8723 in. This diameter must be central with the 0.750-in. pitch dia of the spline and with the centerline of the shaft within 0.004 in. tir. The 24-in.-dia, 60-K-grit wheel runs at about 500 sfm

Contour turning transaxle converter oil-pump shafts is automatic in this tracer-controlled Karge bar-fed "Turnomat." Positive-rake Valenite C-7 throwaway carbide inserts are set at 6° rake to swing chips out of the grooves produced. Special diamond shaped tools provide two cutting ends and are used here with mechanical chip breakers



Gun drilling long transaxle converter-pump driveshafts is automatic in Century-Detroit machines. A 0.250-in. plus 0.010-in. minus 0.005-in. hole is produced in shafts nearly 2 ft long. Drill speed is 4400 rpm with a feed of 0.0006 ipr. Coolant pressure is 950 psi. Two split Nylon support bushings are used at each drill along with a carbide starting bushing, and CI grade carbide shaves rather than cuts



Tempest features 4-wheel independent suspension, flexible driveshaft that transmits power to transaxle at rear, and 4-cylinder engine that is half of the big Pontiac V-8

components of the new transaxle are Karge "Turnomat" bar-feed tracer lathes. These contour turn, groove, chamfer, and cut off transmission-converter oil-pump shafts made of SAE 8660 steel. Bars feed through a collet in the headstock and are supported by the traveling carriage on which the toolpost—and a tool turret—are mounted. The single-point carbide turret tool produces one of the grooves required in the part while the rest of the contour is turned with a single-point tool in the toolpost as it follows a templet.

A 15-in. LeBlond lathe is also fitted up with a Karge attachment for contour turning and grooving AISI C-1041 tubing to produce transmission-turbine shafts. These parts are first straightened and centerless ground to fit a "floating" collet in the LeBlond machine. Four air cylinders spaced 90° apart around the collet provide this cushion or float. Thus, the OD of the part is supported in the floating collet while the ID is held between centers and contour turning of the OD is concentric with the ID. The toolpost movement is controlled by a templet at the front of the machine while the carriage on which it is mounted travels along the shaft length.

Gun drilling is not overlooked in machining transaxle parts either. Three Century-Detroit machines equipped with 0.250-in.-dia, 2-ft-long Eldorado drills each handle two transmission-converter pump drive shafts at once. Cycle time of 12 minutes for each two parts is sufficiently long to allow one operator to handle all three gun-drilling machines.

Report from Detroit . . .

Mechanized handling . . .

Automatic welding . . . Hydraulic expanding . . .

Chrysler automation

Chrysler Newport has alternator electrical system that fires plugs and stores power to operate the starter

By Ben C Brosheer, associate editor

Small-parts production can be a headache in the automotive world, too; but Chrysler has mechanized ring production at Indianapolis for minimun supervision and maximum mechanical materials handling.

Automatic shearing, roll forming, welding, and sizing are tied together with mechanized handling units in a new production line at the Chrysler plant in Indianapolis to help make high-quality starter-motor frame rings at the lowest possible cost.

The frame rings for the new 12-volt, 4-pole automotive starter motor now being installed in Imperial and Chrysler cars are formed from 19/64-in. thick, 4-in. wide bars of pickled SAE 1010 Bessemer steel specially selected for ease of welding.

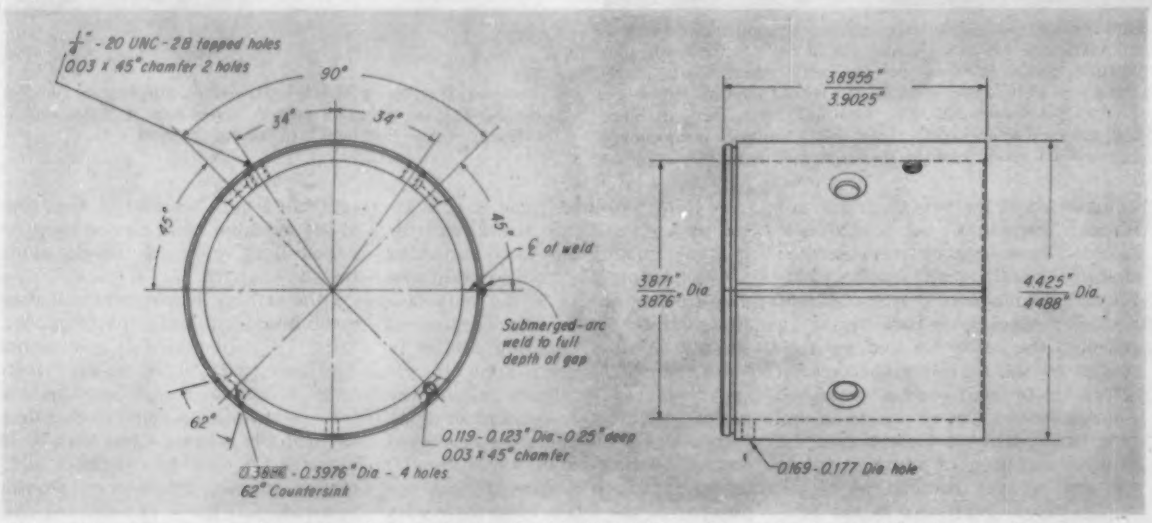
These bars are automatically sheared to 12.88-in. lengths, ±0.008 in., then rolled into rings, cleaned, and delivered to an automatic submerged-arc seam welder without attention, except for periodic inspections and adjustments by a machine operator who regularly patrols the forming end of the line.

Stacked mill-length bars (12 to 15 ft long) are automatically fed to a precision shear by a destacking unit that selects and picks up individual bars from a platform kept filled by a bridge crane shuttling between the line and the receiving dock.

Sheared blanks are moved on a belt conveyor to the automatic Buffalo Forge roll former (see photo), where they are rolled into rings. These formed blanks automatically are chuted to the loading end of a steam-heated Detrex parts washer, where chain conveyors move them through sprays of hot alkaline cleaning solution and rinse water for a two-stage cleaning cycle.

An automatic parts elevator loads cleaned frame rings into a Cook & Chick storage silo (see photo), whose helical chute has capacity for 440 rings. Location of this silo in the center of the line provides cushioning capacity, so either end of the line can be operated even when production operations may be delayed in the other section.

A shorter automatic parts elevator is positioned at the discharge end of the storage silo to feed rings to the loading fixture on the automatic seam welder. This fixture (see photo) aligns two parts axially,



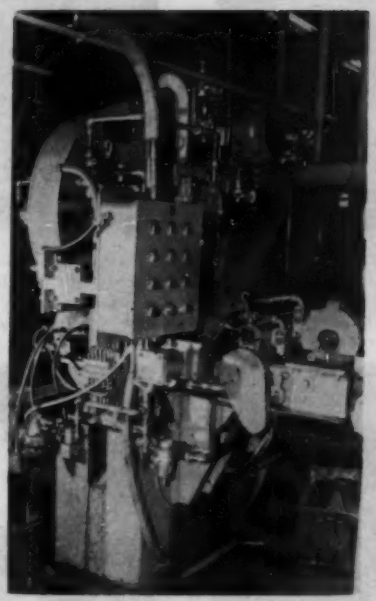
Sizing with a Grotnes expander replaces bore machining for this SAE 1010 steel frame for the new Chrysler 12-volt starter motor

makes starter frames

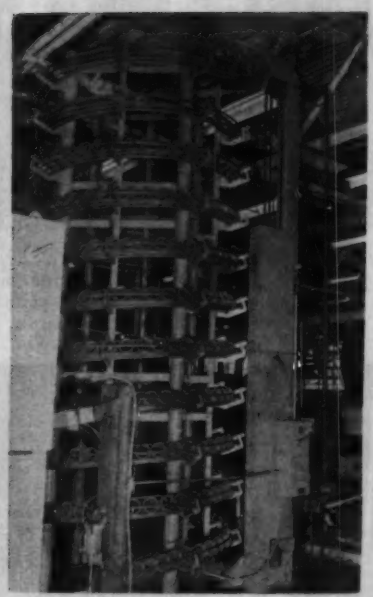
orients their gaps in line with the welding head, and feeds them axially over water-cooled copper chill bars which make possible 100% closure of each gap with weld metal.

The special National Electric submerged-arc seam welder (see photo) uses a Linde DeH-U head to feed ⅛-in. L60-SC2 copper-coated steel welding wire and granular flux to the passing line of rings. Welding power is furnished by a Lincoln 35-volt, 60-cycle, 1200-amp ac generator. Automatically actuated supports open and close to permit two rings to pass at a time along the copper chill bars, while holding these bars tight against the bores of the rings directly under the gaps being welded.

Hourglass-shaped rolls hold the ring gaps together at and immediately following the welding position, until deposited weld metal cools and solidifies to lock the frame seams. Then the welded rings pass along to a discharge position where a horizontal air cylinder pushes each successive ring sufficiently to break the joining weld bead between the rings and drop each ring into a chute.



Mill lengths of bar stock automatically are fed to Buffalo automatic shear where blanks for motor frame rings are cut to length within ±0.008 in. Belt conveyors move stock and blanks to and from shear

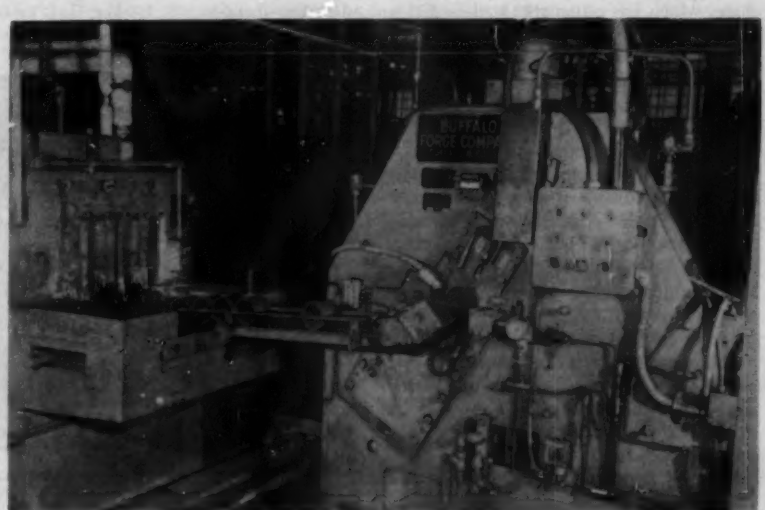


Helical chute of this Cook & Chick parts silo will hold up to 440 frame rings. Silo is loaded and unloaded with automatic parts elevators

Conveyorized parts cooler

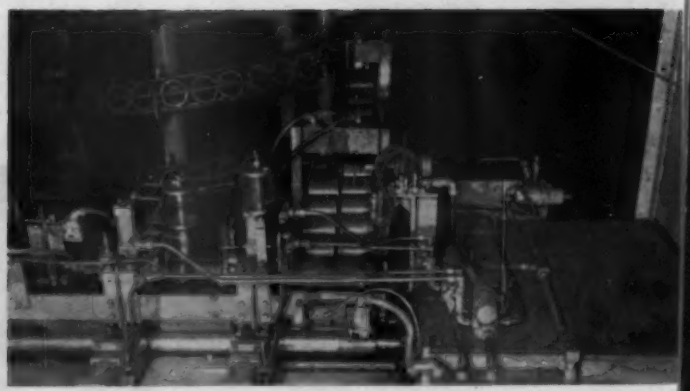
Welded rings move without attention into a conveyorized Detrex flushing cooler, where a water-soluble alkaline solution is sprayed over them to cool the weld areas to approximately room temperature, and to flush away any remaining flux. The solution is pumped through an Airtemp fluid chiller, which has capacity to maintain 2100 gal of solution per hour at 60F when cooling parts to 90F under the most difficult conditions, when plant temperature rises to 100F or more during some summer days.

Cooled rings are moved by a belt conveyor to an automatically loaded and unloaded 8-in. Grotnes vertical hydraulic expander, where ring bores are expanded to the specified 3.871-3.876 in. ID in one unattended operation. This eliminates need for boring the rings to size with cutting tools, and the stretching force imposed results in a stronger frame ring. Only one operator patrols the



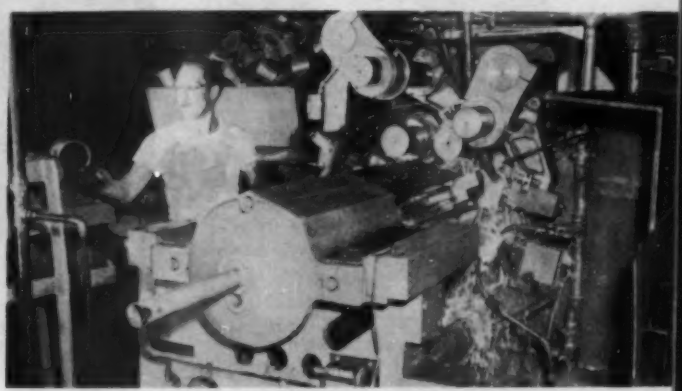
Flat blanks automatically are formed into frame rings in this Buffalo rolling machine, then fed by belt conveyor to adjacent (left) washer where they are cleaned with hot alkaline solution, then spray-rinsed

Axial gaps in frame rings automatically are submerged-arc welded in special National Electric machine, which uses water-cooled copper chill bars to permit 100% penetration of gap. Parts are fed two at a time



Solenoid valves control cylinders which align and feed two frame rings at a time into submerged-arc seam welder. Each ring automatically is oriented to align gap seam with welding head for full-depth welds

Bores of starter motor frame rings are sized within 0.005 in. with hydraulically-expanded arbor of vertical Grotnes machine, which has automatic loaders and unloaders for operation without attention



Frame rings are faced to length, grooved at one end, and chamfered in a New Britain-Gridley 8-spindle automatic chucker, then moved to nearby drilling machine along chutes. Carbide-tipped tools are used

second half of the frame-ring line.

Sized rings are discharged into lift-truck chute bins for transfer in lots to an adjacent machining group, where the frames are finished ready for the starter assembly line.

First, the rings are straddle-faced on the two ends, and one end is grooved and chamfered in a Model 88 8-spindle New Britain-Gridley chucking machine, loaded manually from a chute bin. These rings then move down conveyor chutes to a special Kingsbury drilling and tapping machine where four pole-bolt holes are drilled and chamfered, a locating hole and a drain hole are drilled, and two control-box-mounting holes are drilled, tapped, and chamfered.

Finally, the frame rings are wire-brush deburred and washed.

Special Kingsbury drilling and tapping machine performs final machining operations on frame rings, then they are wire brushed and cleaned

AMC die-casts aluminum blocks

Rambler die-cast aluminum engine puts out 127 hp from 195 cu in. This is the 108-in.-wheelbase model

By George DeGroat, Detroit editor

Six-cylinder inline engines for the '61 Rambler "Classic Six" include the first die-cast aluminum engine blocks produced in this country. Each 67-lb block contains 53 lb of aluminum, plus 14 lb of CI cylinder liners added automatically during casting. An automated line at Doehler-Jarvis division of National Lead Co, Toledo, Ohio, turns out the blocks in four new 2000-ton machines with automatic ladles, loaders, and unloaders at 20/hr

When American Motors decided to use an aluminum engine in a compact Rambler, they investigated sand-casting, permanent-mold-casting, and die-casting techniques for making cylinder blocks and heads. The greatest manufacturing economics were found to be possible with diecasting, so an extensive research program was undertakzen with Doehler-Jarvis — ending in a brand new die-cast aluminum block for the 1961 Rambler "Classic Six." The new engine has a CI head, but continuing research is expected to resolve die-casting problems on the aluminum head in time for the 1962 model year. Development work is currently under way to solve coring problems on close-tolerance water and exhaust gas ports.

Among conditions to be met in the design of the new engine were the use of dry sleeves, a drop center crankcase, and hydraulic valve lifters, among others. A major goal was to produce a quieter power plant than the older CI engine. This meant closer-than-usual tolerances in journal bearings, crankshaft bores, and in other areas.

An extremely close relationship existed among manufacturing engineers, machine and die designers of both AMC and D-J, and the engine designers. For example, the S-12-A aluminum alloy is a compromise between the most desirable die-casting alloy and the best possible engine-block material. Various elements of engine-block geometry were designed to accommodate die-casting requirements. On the other hand, the dry-sleeve specification was met despite the fact that wet sleeves are easier to die cast.

Stress analysis

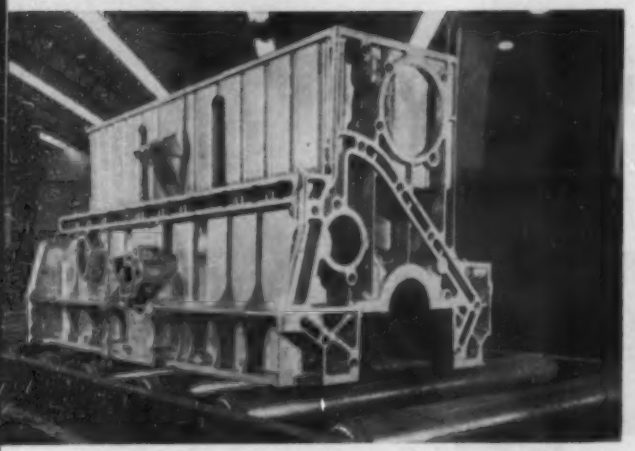
The most extensive stress-analysis technique in the auto industry was applied in designing these blocks. The relatively new Zandman technique is a modification of photoelastic stress analysis where stress is applied to plastic models. The block itself is coated with plastic and examined under polarized light while stresses are applied.

Now four machines are in full production at Doehler-Jarvis—each producing about 20 blocks per hour. The cold-chamber technique produces 12.5%-silicon aluminum-alloy blocks with 129 cored holes and six cast-in liners. Eight loose pieces are successfully and economically added —the six CI liners and two pieces to form camshaft bores. All are installed automatically in a minimum portion of the cycle time. The six liners are preheated before automatic loading to avoid thermal shock and to provide sufficient expansion to permit them to slip over core pins in the die.

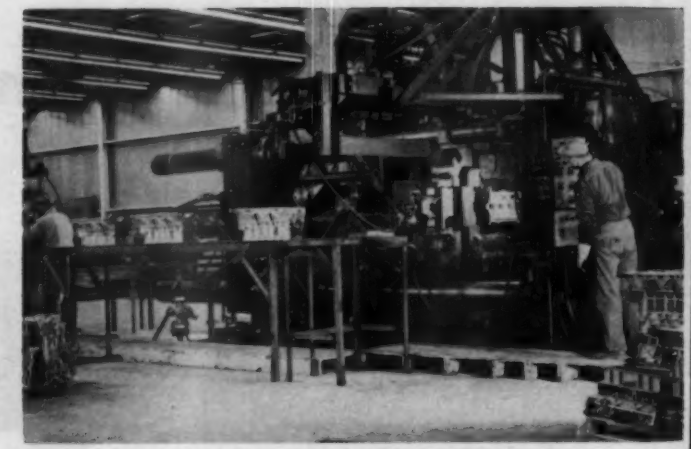
Each shot requires 65 lb of molten aluminum in the hot sleeve—poured by an automatic ladle—with injection into the die in 0.3 sec under 8000-psi pressure. Chilling time is 30 sec, after which the die is opened and unloaded automatically. Large hydraulic cylinders lock the die against this high injection pressure and mechanical locks handle the large side cores. Die-service time runs close to 2 minutes, although improved techniques are expected to cut this somewhat. After ejection, the die is automatically flushed with cooling water and the operator applies the die lubricant and removes small pieces of flash. Large pieces of flash are automatically knocked off the block.

A mechanized line handles this part of the job. Flash and the loose parts that form camshaft bores are removed in a special hydraulic setup, after which the blocks are loaded onto pallets for transfer to other operations. Trimming, filing, and a pressure test are among the final operations which are concluded by a

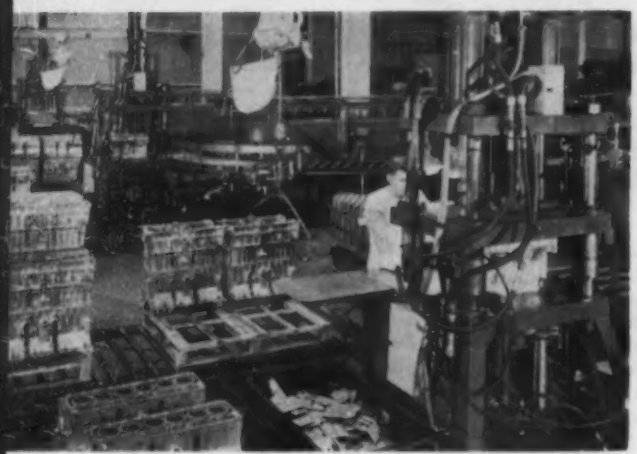
Report from Detroit . . .



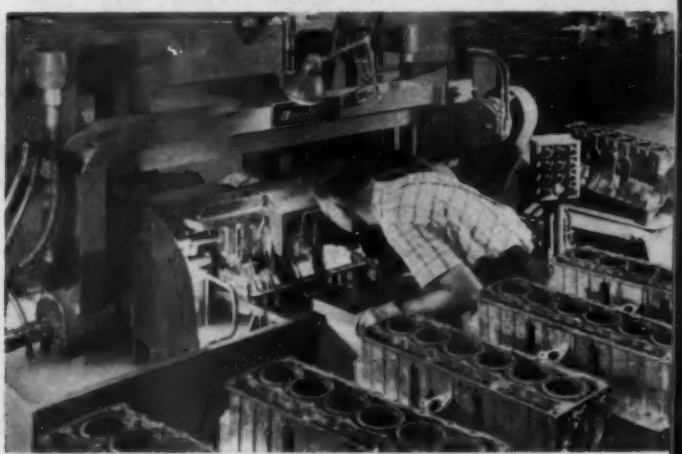
Die-cast aluminum engine block weighs 67 lb and includes 129 cored holes plus cast-in iron cylinder liners



Doehler-Jarvis 2000-ton die-casting machine operates with a water-emulsion fire-resistant hydraulic fluid. Dies are sectional for improved life, simple maintenance, and low thermal shock



Hydraulic presses trim flash, first from two sides and bottom, then from both ends and the cylinder bores



Pressure test at a special Turner machine checks for flaws. After a following Magna Flux inspection for cracks, the blocks are shipped to AMC

Magna Glo inspection for cracks or other defects in the cylinder liners.

At American Motors Corporation the die-cast blocks are machined on a new line at a rate of about 105 per hour. Considerable cost savings are gained in these operations, compared with the cost of working CI blocks. Principal reasons for the manufacturing-cost reduction is reduced machining time as a result of smaller amounts of metal removed from die-cast blocks, the elimination of drilling, countersinking, and similar operations in cored holes, and the higher speeds and feeds used in machining aluminum.

REPRINTS ARE AVAILABLE

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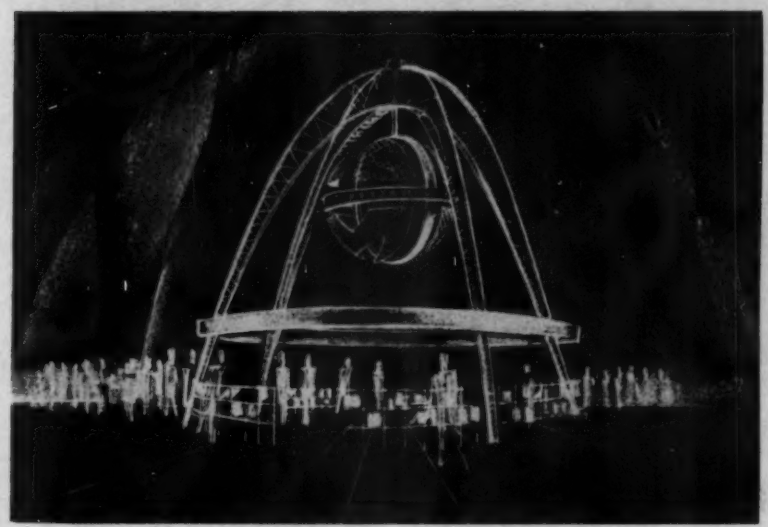
American Machinist/Metalworking Manufacturing special reports

Order from Reader Service Dept., American Machinist/Metalworking Manufacturing, 330 W. 42nd St., New York 36, N. Y. Single copies of this report are 35¢; prices are reduced for quantities over 100. Other reports are priced at 35¢ if 16 pages, and 25¢ if 8 pages. A list of current reprints is available from Reader Service Dept.

1960 METAL SHOW

Philadelphia, October 17-21

Nearly 300 exhibitors will display products in eleven categories at the 1960 Philadelphia Metal Show, October 17-21. The show, which is sponsored by the American Society for Metals and held in conjunction with the 42nd National Metal Congress, will be in the Philadelphia Trade and Convention Center. The eleven categories—which were chosen by ASM following interview research among visitors to earlier Metal Shows—are designed to provide more product and service information on materials, processes, fabrication, and inspection methods than ever before.



Steel Quadrilon will be one of the focal points of the 1960 Philadelphia Metal Show. This 34-ft-high symbol of modern steel will provide a striking setting for the formal opening ceremonies at 11 am on October 17. Arrayed about the crossed arches of this "Steel Arena" will be the exhibits of 16 major firms

Steel Arena

One of the focal areas of the show will be the dramtic theme tower in the Steel Arena. Made entirely of steel, this quadrilon will rise 34 feet above the exhibit floor and support a huge steel sphere that features the ASM seal and the Steel Arena theme: "Build it Better with America's Steel." Grouped around the theme tower will be displays from 16 of the nation's major steel firms.

One of the featured demonstrations will be the display of a 1961 Chevrolet Impala sport sedan, surrounded by the raw steel that goes into this automobile. Included in this display will be cold rolled sheet, hot rolled sheet, hot rolled carbon bar, hot rolled alloy bar, stainless steel, and hot holled SAE 950—all identified by type, methods of forming, processing, and finishing. Partially finished parts will demonstrate details of processing.

The Steel Arena will be in the Center's main arena, directly above the halls housing exhibits in ten other metalworking categories.

Eleven product categories

Because its survey of visitors pointed out definite fields of interest, ASM required exhibitors to display products in one of eleven basic categories. In addition to displays in the Steel Arena, which will contain producers and distributors of **ferrous metals,** the ten other metalworking categories at the Metal Show are:

- **Nonferrous metals,** producers and distributors
- **Related engineering materials**
- **Nuclear materials** and equipment
- **Tool materials, cutting off and forming** equipment
- **Industrial heating** equipment and supplies
- **Cleaning and finishing** equipment and supplies
- **Welding and joining** equipment and supplies
- **Testing, inspection and control** equipment and supplies
- **Metals production and casting** equipment and supplies
- Parts, forms, and shapes for **design and application**

These categories are designed to make this the "most metallic" Metal Show yet.

Consultants to metalworking

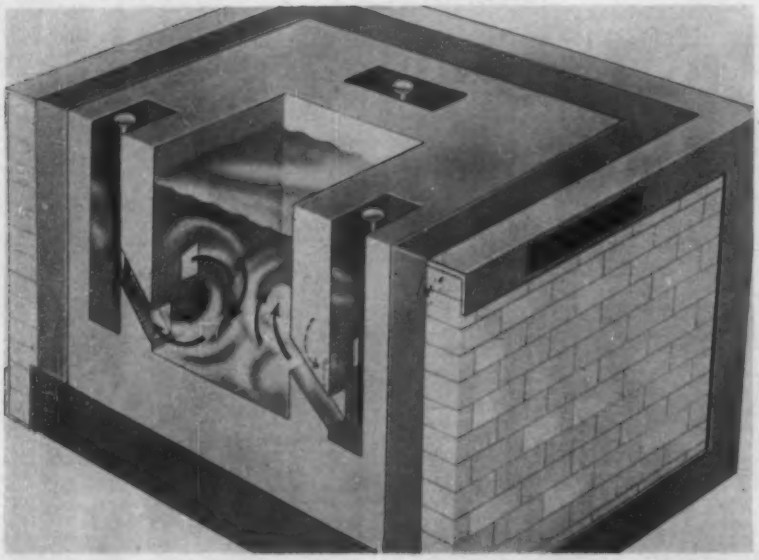
Nearly 200 technical, marketing, and sales experts from the steel industry will be on hand during the show as "consultants to metalworking." Wearing special badges, these experts from each of the 16 exhibiting steel companies will be in their booths in the Steel Arena so that they can assist visitors with any specialized problems they might have.

Technical sessions

The technical program of the ASM, which will be presented at the Metal Congress concurrent with the Metal Show, will have two major subdivisions: Sessions of the Transacting Committee will deal with the more scientific aspects of metals, while programs of the Metals Engineering Program Committee will emphasize the practical engineering aspects of materials and processes.

In addition to the ASM technical sessions, seven participating technical societies will also have symposiums and other meetings in conjunction with the Metal Congress. See page 132 for a discussion of the technical programs of the ASM and other participating societies.

1960 Philadelphia METAL SHOW IN PRINT



New Convection Flow Development Boosts Heating Capacity of Upton Salt Bath

The Upton Cross-Channel furnace makes more effective use of the convection currents created in molten salt by heat from electric current.

Heating is done by passing current through pairs of oppositely sloping passages or tunnels in the walls which separate the main portion of the salt balt from adjacent small wells where current is introduced by ordinary hanging electrodes.

The convection flow of salt moves upward from the main salt bath to the electrode well, while the flow in the other passage is upward from the well to the main salt bath.

A delicate hydrostatic balance exists between the two passages because they open at each end freely into liquid volume at the same level and little force is required to effect a rapid circulation between the two chambers. Thus, there is little difference in temperature between the main salt bath and the electrode wells, even though the power supplied to the bath is very much greater than has been heretofore possible in any type of salt-bath furnace.

A furnace 12 in. square x 30 in. deep can easily use 100 kw, and can heat from room temperature, per hour, 1200 lb of steel to 1600 F or 800 lb of steel to 2300 F, performances far above anything attainable before, reports Upton Electric Furnace Co, developer of this new unit.

The monolithic ceramic wall insures a positive seal and extremely low salt absorption. There is no limit on bath area or depth.

Lindberg Engineering Co, 2450 W Hubbard St, Chicago, Ill

MORE DATA? Circle 540, inside back cover

One Man Can Handle Picker X-Ray Unit

Designed for fast on-the-job inspection by one man, the Industrial Image Amplifier is a 50-lb X-ray unit that allows continuous, quick inspection inside a wide variety of metal products. The fluoroscopic inspector is designated Model 140 by the maker.

The unit reportedly produces an image more than 1000 times brighter than a conventional fluoroscopic screen. The image can be viewed directly under normal lighting, put on television monitors for group viewing, or recorded permanently with cameras.

Company will also exhibit two magnetic-particle inspection units at the Show: the Ferroscope, designed for surface and open sub-surface inspecion of metal products; and the Ferroflux, a 30-lb portable unit for use in the field or plant.

Picker X-Ray Corp, 25 S Broadway, White Plains, NY

MORE DATA? Circle 541, inside back cover

Gray Proportioning System Mixes, Dispenses Paints

Called the Hydra-Cat, this proportioning system pumps, meters, transfers, mixes, and dispenses two chemically reactive materials for finishing operations. A pneumatic power unit pumps the two materials, proportions them, filters them, then powers their transfer through separate flexible hoses to a mixing and dispensing gun. Here the materials are pre-blended, then mixed and applied by airless spray.

Thirteen mix ratios, ranging from 1:1 to 4:1, are available with the system. The pump will stall out against pressure, insuring instantaneous control, and eliminating need for auxiliary control circuits, by-passes, or power engagement devices. Materials are completely sealed and protected from contamination.

Further information is available in Bulletin 301-068, suppiled by the maker.

Gray Co, Inc, 1046 Sibley St, NE, Minneapolis 13, Minn

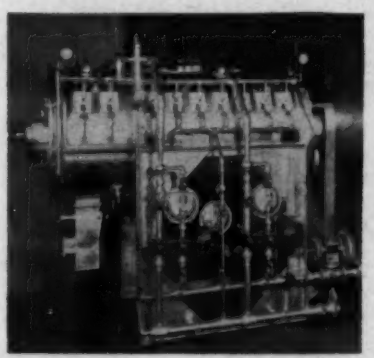
MORE DATA? Circle 542, inside back cover

Tempil Introduces Spray Cans for Temperature-Indicating Coatings

Tempilaq, the temperature-indicating liquid, is now being packaged in Aerosol spray cans to provide a convenient method of coating large surfaces. In some forty temperature ratings from 100 to 650 F, Tempilaq is available in either the spray cans or glass bottles. From 700 to 2500 F, it is supplied only in glass bottles.

Tempil Corp, 132 W 22 St, New York 11, NY

MORE DATA? Circle 543, inside back cover

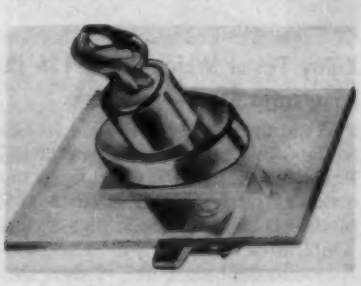


Automatic Furnace and Quench Unit Keeps Parts in Motion

"Automotion" is the word American Gas Furnace Co uses for the Model 136-MGE it will display at the Show. Parts are moved through the furnace retort and quenching drum by a spiral, and the continuous motion is claimed to assure that the entire surface of all parts will receive the same heat and exposure to the atmosphere. The furnace has a built-in continuous feeder that virtually eliminates the labor in feeding parts. Heating capacity is approximately 250 lb per hr.

American Gas Furnace Co, Elizabeth 13, NJ

MORE DATA? Circle 544, inside back cover



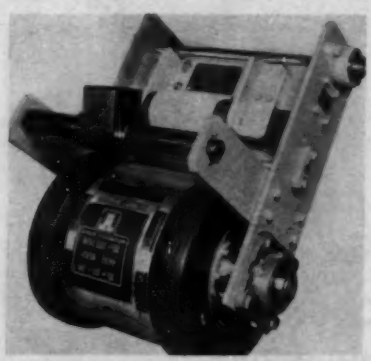
Adjustable Pawl Pull-Up Is Combined with Lock

The specialty fastener illustrated above is a locking, adjustable-pawl device. Zinc-plate coating is standard, but chrome plate is available on special order.

At the Metal Show, maker will also demonstrate four other new fasteners: an adjustable-pawl fastener without lock; a blind-rivet assortment kit, miniature quarter-turn fasteners; and specially mounted miniature fasteners.

Southco Div, South Chester Corp, Lester, Pa

MORE DATA? Circle 545, inside back cover



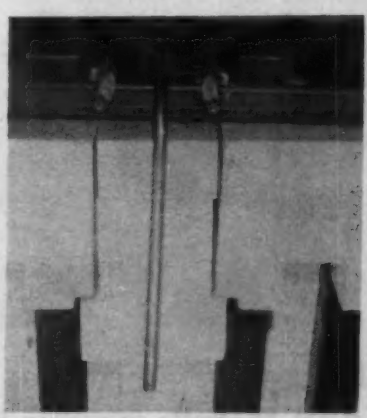
Matthews Printer Marks Sheets At Speeds Up to 2000 fpm

A newly designed printer, Model 5628 was developed principally for the strip-steel industry. Used on shear lines, recoil lines, and slitting lines, it can print coated and uncoated stock with such data as names, trademarks, and dates of manufacture.

The printer mounts over or under conveyor lines to print flat strip or sheet, or it can mark stock directly while it is being coiled. Satisfactory printing results are claimed at speeds as high as 2000 fpm.

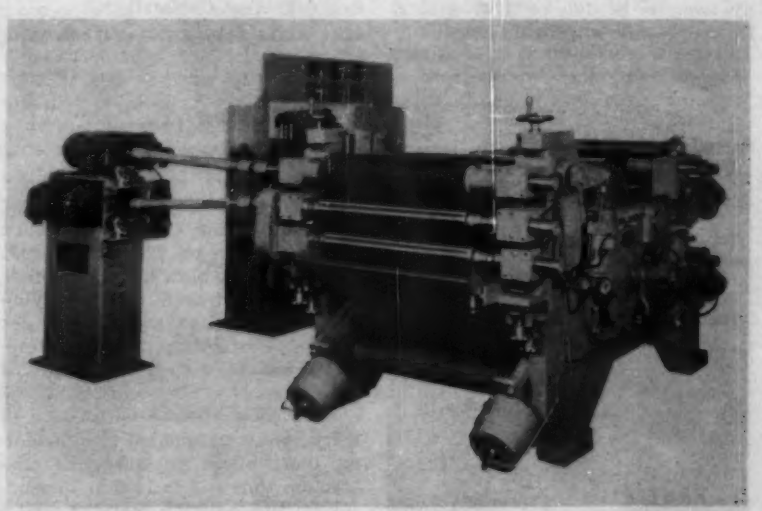
Jas H Matthews & Co, 3942 Forbes St, Pittsburgh 13, Pa

MORE DATA? Circle 546, inside back cover



NEW STYLE ELECTRODE of HCRE neutral hardening or aluminum brazing furnace protects electrodes at air-salt interface and allows rapid replacement of electrodes so that furnace downtime is held to minimum. The equipment, which has better insulation, is priced lower than previous models—*Ajax Electric Co, Frankford Ave at Delaware Ave, Philadelphia 23, Pa*

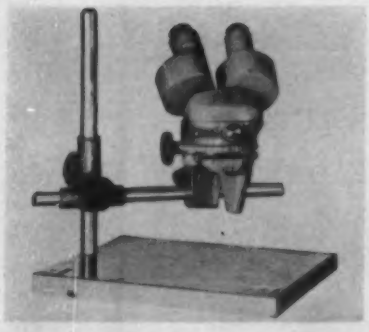
MORE DATA? Circle 547, inside back cover

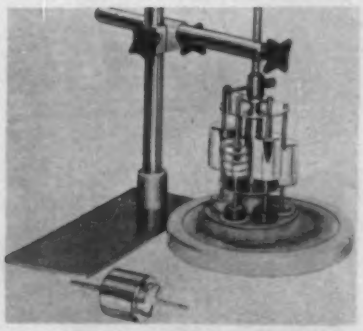


TRIPLE-HEAD COATER puts a coating on both faces of strip metal in one pass. Each coating head has two precision-ground, chrome-plated metering rolls followed by a rubber-coated applicator roll. The roll speeds are individually variable to insure maximum control of coating process—*Waldron-Hartig Div, Midland-Ross Corp, Box 791, New Brunswick, NJ*

MORE DATA? Circle 548, inside back cover

1960 Philadelphia METAL SHOW IN PRINT





Hacker Demonstrates Optical Instrument And Metallographic Equipment

Watson stereoscopic microscopes (left) are available in a wide range of styles and with a full line of accessories (stands, illuminators, camera attachments, etc). Magnifications range from 6.25 to 140 in ten steps.

The Pdm Samplemover (right) can polish up to six metallographic specimens at the same time. Specimens (from 1 to 1¼ in. diameter) are inserted in the holder and are pressed against the polishing disk by weights of 100 or 1000 grams. Device is said to provide absolutely uniform polishing pressure. It sells for $225.

Surface finish can be tested interferometrically with Reichert metallurgical microscopes and metallographs through use of any one of three new accessories. All three devices make use of Newton interference fringes for measurement of surface roughnesses ranging from 1 to 0.015 micron.

William J Hacker & Co, Inc, PO Box 646, West Caldwell, NJ

MORE DATA? Circle 549, inside back cover

Colored Stainless Sheet and Strip Available in all Popular Sizes

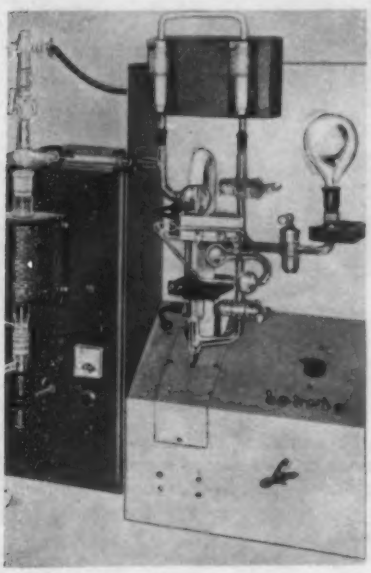
ColorRold stainless steel is available in 11 standard colors—three metallics and eight non-metallics—and in all popular widths and gages.

Coating thickness is accurately controlled at any point from ½ to 2 mils. The coating is prepared by dissolving resins in organic solvents. When baked at moderate temperatures, a thermosetting film of high durability is produced.

The coated material conforms well to fabricating techniques common to uncoated stainless steel—shearing, blanking, bending, brake forming, roll forming, and so on. Bulletin available.

Washington Steel Corp, Washington, Pa

MORE DATA? Circle 551, inside back cover



Leco Will Show Compact Hydrogen Analyzer

An inexpensive, compact hydrogen analyzer, to be exhibited by Laboratory Equipment Corp, will guard against hydrogen embrittlement, flaking, casting blow holes, and other effects of hydrogen by identifying traces as small as a few parts per million. Employing the hot extraction principle, the unit meets ASTM requirements of 1200 and 2192 C operating temperature. Outgassing of a crucible is eliminated by a patented, inert, blank free susceptor. Extraction time is 3 to 10 min, depending on the material analyzed, and a sample can be loaded and removed from the system without breaking the vacuum.

Laboratory Equipment Corp, St Joseph, Mich

MORE DATA? Circle 550, inside back cover

X-Ray Tester Weighs Only 136 lb, Penetrates Steel 4-in. Thick

The Baltograph 300 is offered in two models—the Model D and the Model P. Each weighs only 136 lb, and has a power rating of 300-KVP, 3 MA. Model D is for single beam use, while Model P is for 360° Panoram-X radiography. Both models are convertible from one type to the other at any time at nominal cost.

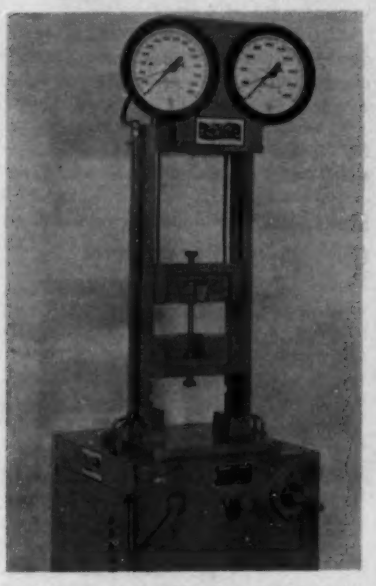
The x-ray head of the Baltograph 300 is cylindrically shaped, and measures 46¼ in. long x 12¼ in. in diameter. Incorporated in the head

is the x-ray tube, lead shielding, HT transformer; filament heating transformer, automatic thermal cut-off device, and receptacles for control panel connector cables.

The control panel is complete and includes a penetration meter, penetration selector, MA control, and automatic reset timer which is powered by push buttons. It is enclosed in a dust and weatherproof metal cabinet measuring 15 x 12 x 7 in.; it weighs 41 lb.

Balteau Electric Corp, Stamford, Conn

MORE DATA? Circle 552, inside back cover



Steel City Tester Has 40,000-lb Capacity

Two motorized tensile testing machines will be shown for the first time at the Metal Show. Model TE-40 has a single load gage; Model TE-40-A has twin gages (see picture). Each machine has a 40,000-lb capacity.

Stroke of the testers is 4 in., and specimens up to 10 in. long and 2 in. wide can be handled. Each unit weighs about 1050 lb, is 72 in. high, 24 in. deep, and 23 in. wide. Price of standard single-gage model is $3475.

Steel City Testing Machines, Inc, 8817 Lyndon Ave, Detroit 38, Mich

MORE DATA? Circle 553, inside back cover

Cincinnati Sub-Zero Introduces Portable High-Low Temp Tester

The Hi-Lo model temperature tester, which was designed for laboratory applications, gives a temperature range of –150—250 F, ±2 F. The door of its 14 x 14 x 14-in. test chamber opens at work bench height; the control and recorder are at eye level, right over the door.

Accessories available include terminals, ports, and programming instrumentation. The tester, which can incorporate altitudes up to 200,000 ft, has a three week delivery date.

Cincinnati Sub-Zero Products, 3930 Reading Rd, Cincinnati 29, Ohio

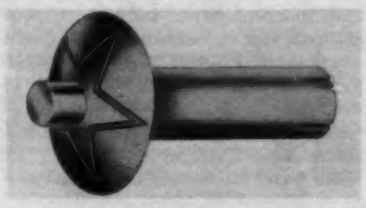
MORE DATA? Circle 554, inside back cover

Portable Electrostatic Spray Gun Can Be Moved to Outside Jobs

The new Model 10 hand gun will be in operation at the Ionic Electrostatic Corp booth. As the entire system is portable, it can be moved, even to outside jobs such as fences, metal and cinder block buildings, storage tanks, and piping. The unit disperses pre-atomized, charged particles of coating material and works equally well with metallic and nonmetallic paints and coatings. The hand gun weighs 1¾ lb and is available with either a straight or 45° angle head.

Ionic Electrostatic Corp, 111 Monroe St, Garfield, NJ

MORE DATA? Circle 555, inside back cover



Special Hammer-Driven Pin Substitutes for Rivet

Driven into holes with an ordinary hammer, the Star Pin-Grip does the job of a conventional rivet. When the pin (see photo, top) is driven down flush with the head, the slotted shank expands and grips firmly. At the same time, the knurled pin locks itself in position.

The drive pin is stainless steel, and the rivet body is aluminum alloy 2117-T4.

Star Expansion Industries Corp, Mountainville, NY

MORE DATA? Circle 556, inside back cover

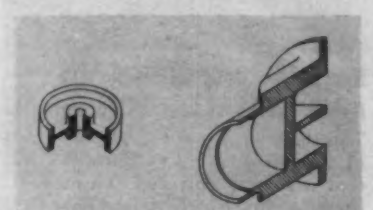
Roll-Around Ultransonic Cleaner Requires No Plumbing Fixtures

This self-contained ultrasonic cleaner, which is mounted on large casters for ease of movement and quiet operation, consists of an ultrasonic generator, transducer, and counter top. Optional accessories include a 2—5 micron filter and heating elements to maintain liquid temperature from ambient to 160 F.

Because the cleaner is drained by means of a flexible hose connected to the unit, no connection to drain or plumbing is required. Tanks are positioned off-center to provide a work area on which the baskets can be placed.

National Ultrasonic Corp, 111 Montgomery Ave, Irvington 11, NJ

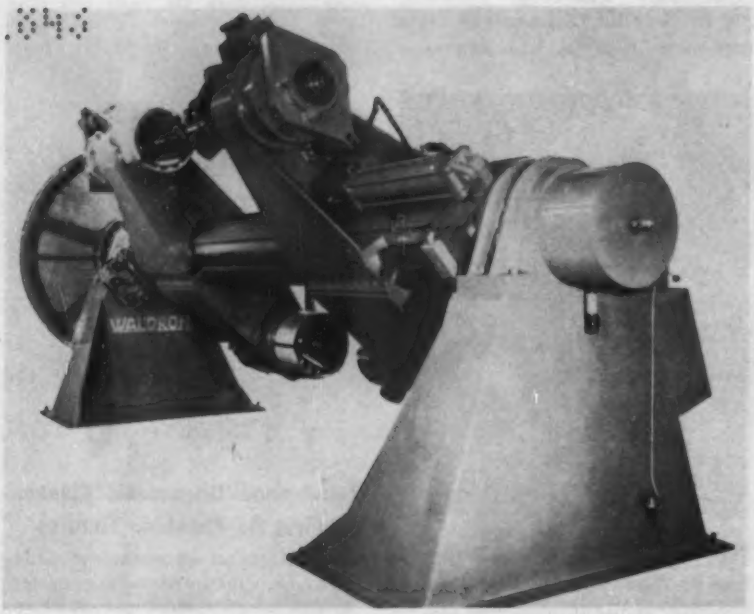
MORE DATA? Circle 557, inside back cover



EXTRUSIONS AND DIE FORGINGS will be exhibited to demonstrate the versatility of cold and hot extrusion and hot die forging—*Janney Cylinder Co, 7401 State Rd, Philadelphia 36, Pa*

MORE DATA? Circle 558, inside back cover

1960 Philadelphia METAL SHOW IN PRINT



UNCOILING MACHINE can handle coils with diameters as large as 60 in. Widths that this Model 12000 uncoiler can handle range from 18 to 66 in., with maximum weight of 12,000 lb per coil. Unit is quickly adjustable to demands of in-line operation, and variations in coil sizes, through a centralized control panel—*Waldron-Hartig Div, Midland-Ross Corp, Box 791, New Brunswick, NJ*

MORE DATA? Circle 559, inside back cover

Magnaflux Inspection Device Measures Thickness Ultrasonically

The Sonizon So-300, a transistorized inspection device is a portable unit that is battery powered. This direct-reading unit, which weighs only 12¼ lb, measures thickness from one side only of steel, plastics, cast iron, brass, and any other material that transmits ultrasonic sound.

By placing a probe on the surface of the piece to be measured and rotating a dial, an inspector gets a reading of the part's thickness. Checked against a known sample, the unit gives accuracy better than ±1%.

Other products to be exhibited at the Metal Show: several new water- and oil-suspensible materials for visible and fluorescent magnetic-particle testing; a mobile Magnaflux unit (Model KSH-3D) that features 3000-amp current with infinite current control; an electronic instrument (Magnatest FM-500 Elastomat) that measures the elastic properties of materials.

Magnaflux Corp, 7300 W Lawrence Ave, Chicago 31, Ill

MORE DATA? Circle 560, inside back cover

Scherr-Tumico Shows Line of Hand and Optical Tools, Gages

Among the various hand tools, optical measuring instruments, and gaging devices exhibited by the company will be the Linearscope, an optical measuring unit capable of measuring linear dimensions up to 12 in. to tolerances of 0.0002 in. Machine consists of a microscope (or binoculars, monocular, etc) mounted over a traveling table. Table has a longitudinal travel of 12 in. and a transverse travel of 4 in.

Also to be shown are several Zeiss optical instruments, a series of thread measuring devices, and a line of vernier calipers.

Scherr-Tumico Co, 200 Lafayette St, New York 12, NY

MORE DATA? Circle 561, inside back cover

Stokes Vacuum Furnace Gives 3000 F Temperatures

Model 435-585, a new cold-wall vacuum heat-treating furnace, incorporates a top-loading, completely packaged system. In the furnace, temperatures as high as 3000 F may be obtained.

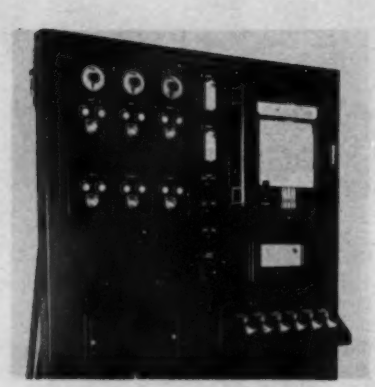
At the Metal Show, the company will also exhibit its new Model 412-H Microvac pump. This pump features vibration-free operation and compact design.

F J Stokes Corp, 5500 Tabor Rd, Philadelphia 20, Pa

MORE DATA? Circle 562, inside back cover

AJAX-BARKLING 515-16 gas fired salt bath furnace is primarily designed for light production, intermittent use type of operation. Rapid change of pots permits use one day for neutral hardening and the next for carburizing — *Ajax Electric Co, Frankford Ave at Delaware Ave, Philadelphia 23, Pa*

MORE DATA? Circle 563, inside back cover



Infrared System Measures and Controls Any of Three Gases

This new infrared multi-colored system for heat treating atmospheres combines measurement and control of any one of three gas compounds —CO, CO_2, or CH_4—in one system. Each system may be calibrated for any one of these three gas compounds and, because sampling probes can be located anywhere in a heat treat, can control from two to six generators, batch furnaces, or zones of continuous furnaces. It can even handle a combination of all three.

The system is a completely assembled package with instruments, analyzer cabinet, and all necessary "hardware" panel-mounted, piped, and wired. The manufacturer says that first users claim this is a major advance in atmosphere control for furnaces and generators.

Leeds & Northrup Co, 4934 Stenton Ave, Philadelphia 14, Pa

MORE DATA? Circle 564, inside back cover

Portable X-Ray Unit, in Two Models, Penetrates to 1⅞ in.

The Baltospot 150, which comes in two models, the 150-P and the 150-D, has a power range of 150 KV, 3 MA and penetrates up to 1⅞ in. steel. The models—each of which weighs 55 lb—are convertible, one to the other, at any time.

Model 150-P has a recently designed 360° x-ray tube which adapts it to circumferential radiography. Model 150-D features a new wide angle 60° tube which allows up to 50% greater linear exposure at any given distance. The port areas on both versions are end positioned for easy access to internal sections too small even to accept the entire head.

The Baltospot 150 is furnished complete and includes the x-ray head, remote control panel box—which weighs 26 lb—plus a storage case and connection cables.

Balteau Electric Corp, Stamford, Conn

MORE DATA? Circle 565, inside back cover

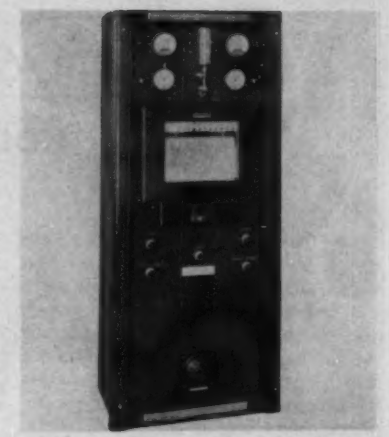
Hayes Vacuum Furnace Has Modular Construction

Model VAC-52 cold-wall vacuum furnace is designed as a complete package. Installation consists of simple connections to water and power. Maximum operating temperature of the standard unit is 2200 F, with vacuums in the 10^{-4} mm Hg range. Max temperature reportedly can be obtained in a few minutes.

The stainless-steel vacuum chamber, 10 in. across and 20 in. deep, has a useful work area of 8-in. dia and 14-in. depth. A crank-operated work pedestal transfers work from lower section (vacuum cooling chamber) to heating chamber, which contains 30-kva heating elements with enough power to heat the chamber to 3000 F when special element and baffling materials are used. Interchangeable heating elements and radiation shields increase the unit's operating flexibility in vacuum brazing and heat treating.

C I Hayes, Inc, 810 Wellington Ave, Cranston, RI

MORE DATA? Circle 566, inside back cover



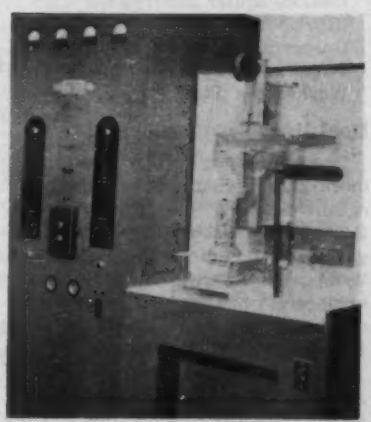
Carbon Potential Controlled By New Rolock Unit

Developed to help maintain precision control over the carbon potential for the gaseous atmosphere in heat-treat furnaces, this carbon-potential control does not use dewpoint as the control basis. Instead, it continuously senses the constant temperature-carbon relationship in a small burning sample of the furnace gas. The sensing element, through a recording controller and servos, promptly corrects the atmosphere.

At the Metal Show, Rolock will also demonstrate its new endothermic gas generator, designed to provide controllable endothermic gas to a furnace, using propane, manufactured, or natural gas as the source.

Rolock, Inc, Fairfield, Conn

MORE DATA? Circle 567, inside back cover



40 KW INDUCTION HEATING UNIT, with 24 position indexing turn-table, has remote control. Power output stepless Thyratron of Model WC-40 can be controlled from zero to max—*Scientific Electric Corp, 105 Monroe St, Garfield, NJ*

MORE DATA? Circle 568, inside back cover

1960 METAL SHOW

Roundup of Technical Programs

More than in many years, the 1960 Metal Show promises emphasis on metals and metallurgy. It will offer a broad program, balanced between pure metallurgical science and application engineering. Recognition of the increasing importance of metals science to the manufacturing people in metalworking is indicated by the eleven product categories established for exhibitors.

A unique service at the show, free to any visitor, will be the "consultants to metalworking" program. Nearly 200 technical, marketing, and sales experts from the steel industry will be available for consultation.

These people are the technical specialists for their companies, are not simply salesmen or booth attendants. Each man will wear a special badge to identify him as one of the "consultants." The list of people offering this service reads like a "Who's Who" of applied metallurgy.

Here are the companies which will be represented:

Allegheny Ludlum Steel Corp
Braeburn Alloy Steel Corp
Carpenter Steel Co
Crucible Steel Co of America
Firth Sterling, Inc
Latrobe Steel Co
Timken Roller Bearing Co
Ulbrich Stainless Steels
Universal Cyclops Steel Corp
Vanadium-Alloys Steel Co
Washington Steel Corp

Steel Users' Symposium

Designed specifically to establish more direct channels of communication between the producers and the users of steel, the Metal Congress will include a three-afternoon Symposium for Steel Users. The symposium will be held in the Philadelphia Trade and Conventon Center, near the Steel Arena.

"Stainless Steels," "Tool Steels," and "Joining of High Strength Steels" are the session topics. They will be covered in that order on Tuesday, Wednesday, and Thursday, Oct 18-20, at 2:00 pm. Sessions, we are told, will be down-to-earth and designed for immediate application in metalworking.

As is customary, the Metal Congress will include the technical sessions of a number of other metals-oriented organizations, including the Metal Treating Institute, the Industrial Heating Equipment Association, the Special Librarians Associations, the Metal Powder Industries Federation, the Society for Nondestructive Testing, the Ultrasonic Manufacturers Association, the Metallurgical Society of the American Institute of Metallurgical Engineers.

Congress topics

Most of the papers given by speakers at the various Metal Congress meetings are highly metallurgical in detail, covering very specific phases of development. The information given is only infrequently directly applicable to manufacturing practice. However, in addition to the user symposium this year, some of the discussions will prove valuable to manufacturing technology.

For example, five speakers in the industrial heating field have been lined up for technical sessions at the Bellevue-Stratford Hotel. Industrial heating aspects of stainless steels will be featured in all five presentations. The program will include such subjects as:

Atmosphere and furnaces for heat treating and sintering stainless products by B A Ruediger, General Electric Co. In this paper, Mr Ruediger will present a practical summary of the various types of commonly-used stainless steels, including aircraft types, and segregated as to their metallurgical characteristics. He will discuss typical heat treatments, significant process variables and essential protective atmosphere requirements. Furnace types and characteristics will be specified where essential for results.

He will point out the growing industrial importance of sintering of stainless steels. A review of the sintering process, its atmosphere and equipment characteristics will be included to solidify the information presented on stainless steels.

Brazing of stainless steel assemblies by H M Webber, Harper Furnace Corp. Mr Webber will spotlight the advantages of furnace brazing of stainless steel assemblies for the aircraft, missile and nuclear fields. He will name the advantages, such as bright brazing without flux to obtain sound bonds and eliminate subsequent cleaning; simultaneously brazing and annealing or hardening of components, depending upon base metals used; and reduction in costs by fabricating from inexpensive components, rather than machining from the solid.

He will discuss helpful techniques or equipment, filler metals, base metals, protective atmospheres, types of furnaces and selection, used in the furnace brazing process.

Treatment of stainless steel flat products by M Robert Ogle, Drever Co. Mr Ogle will discuss the industrial heating aspects of the production of stainless steel flat products in terms of furnace and cleaning equipment. Flat products to be considered in his paper are rolled sheet, plate and strip. He will point to the increasing use of stainless steel materials, and will cover prior furnace practice for the production of stainless plate and sheet, and the development of the type of continuous furnace in use today.

On Friday and Saturday, four sessions of the ASM Metals Engineering Institute will be devoted to metallurgy—fundamentals on Friday and advancing frontiers on Saturday.

Spotlighted by the "Testing, Inspection, Control Equipment, and Research Services" category — a multiplicity of advances in testing equipment and techniques for determining flaws in metallic components forging, castings, etc, will be seen at the show.

Congress topics of interest to Q C engineers include: practical quality control, radiography, fluoroscopy, ultrasonic inspection methods, penetrant inspection, photostress, blacklight inspection three-dimensional presentation of flaws, reliability and quality control, anomalies in steel inspection, and numerous other vital subjects.

Recognition of the increasing concern about the ability to efficiently work many of the new materials as well as the more conventional metals is apparent throughout the Metal Show program. This emphasis on application should benefit visitors.

interchangeable with all standard JIC cylinders

With the introduction of the ALL NEW T-J Squair Head, Tomkins-Johnson now offers industry the most complete design range of air and hydraulic cylinders. Presently available in bore diameters from 1½ to 8 inches, the T-J Squair Head is an interchangeable cylinder which produces maximum force and efficiency, with minimum pressures . . . and is also adaptable to the use of low pressure oil as the working medium. Write to The Tomkins-Johnson Co., Jackson, Michigan, for Bulletin #SQ 10-58 and complete details.

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Illustrated here are (reading from top to bottom): ACR-1642 U. S. Automatic Centralizing Reel; ACC-1648 U. S. Automatic Coil Cradle; SF-68A U. S. Slide Feed with Plain Straightener; PDS-16H U. S. Power Driven Straightener; PDSC-1648 U. S. Combination Cradle-Straightener.

US PRODUCTS

U. S. TOOL COMPANY, INC.

AMPERE (East Orange) N. J.

Frustrums of Cones—I

By Ronald L Wakelee, Chicago, Illinois

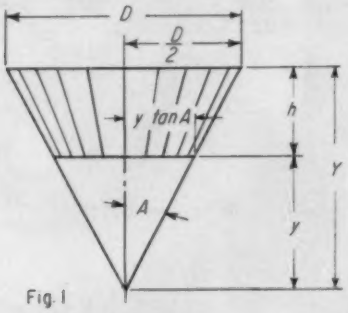

Fig. 1

Frustrum of
Right circular cone

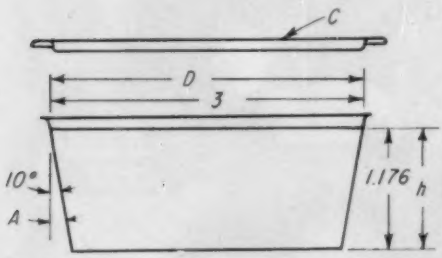

Fig. 2

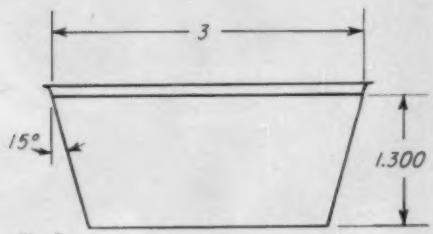

Fig. 3

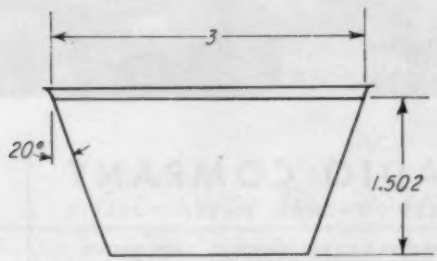

Fig. 4

Efficient solution of problems relating to frustrums of cones may be hampered for lack of quantity A, Fig. 1. This quantity does not appear in the conventional formula for the volume of a frustrum:

$$V = 0.2618\ h\ (D^2 + Dd + d^2)$$

Quantity A, Fig. 1, was needed for solution of a problem involving thin-wall containers of frustrum shape. The customer wished to pack a standard volume in a container with a pleasing profile or side wall angularity.

Selection of can profile starts with certain known factors: Volume V to be packed, open-end diameter D, and an approximate ratio of $D/h = 2\frac{1}{2}$, or $h = 0.4\ d$ as suggested by customer. If possible a standard packer's can end is selected. In this case D is taken as 3. The problem is to find the exact value of h.

First step is to draw up tentative can profiles, Figs. 2, 3, 4, of equal volume, which must be 7.218 cu in. Note that side angularity A is 10°, 15°, and 20° for the three profiles. The value of h in each case is calculated from the formula 7, page 137:

$$h = \frac{D - \sqrt[3]{D^3 - 7.64\ V \tan A}}{2 \tan A}$$

The customer-selected profile is shown in Fig. 2. Here $D = 3$, $A = 10°$ and $V = 7.218$ cu in. By substituting these values in equation 7, $h = 1.176$.

Bottom diameter d of the container is easily found from the formula:

$$\begin{aligned} d &= D - 2 \tan A \times h \\ &= 3 - (2 \tan 10° \times 1.176) \\ &= 3 - (2 \times 0.17633 \times 1.176) \\ &= 2.585 \end{aligned}$$

For derivation of the formula for h and other useful relationships, see page 137.

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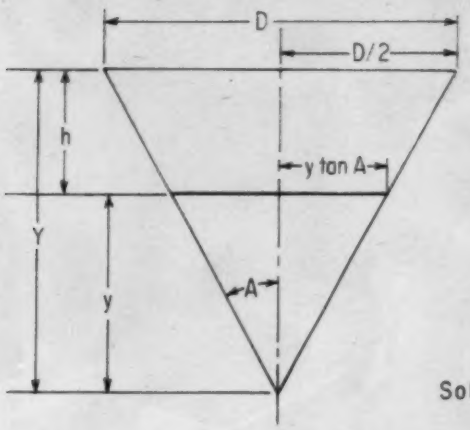
CIRCLE 237 READER SERVICE CARD

Frustrums of Cones—II



The problem: to find h, as for a container, when the volume V is known and the side-wall angle A is known

Solution:

Volume of cone $= \frac{\pi}{3}\left(\frac{D}{2}\right)^2 Y = \frac{\pi D^2 Y}{12}$ ..... ①

Volume of conical segment $= \frac{\pi (y \tan A)^2 y}{3} = \frac{\pi y^3 \tan^2 A}{3}$ ..... ②

Volume of frustrum eq. 1 minus eq. 2 $= V = \frac{\pi D^2 Y}{12} - \frac{\pi y^3 \tan^2 A}{3}$ ..... ③

$Y = \frac{D}{2 \tan A}$ ..... ④

Substituting ④ in ③ $V = \frac{\pi D^2 D}{24 \tan A} - \frac{\pi y^3 \tan^2 A}{3}$

Transposing terms, $\frac{\pi y^3 \tan^2 A}{3} = \frac{\pi D^3}{24 \tan A} - V$

or, $\pi y^3 \tan^2 A = \frac{\pi D^3}{8 \tan A} - 3V$

Solving for y, $y^3 = \frac{D^3}{8 \tan^3 A} - \frac{3V}{\pi \tan^2 A}$

or, $y^3 = \frac{D^3 - \frac{24 V \tan A}{\pi}}{8 \tan^3 A} = \frac{D^3 - 7.64 V \tan A}{8 \tan^3 A}$

Solving for y, $y = \sqrt[3]{\frac{D^3 - 7.64 V \tan A}{8 \tan^3 A}}$

or, $y = \frac{\sqrt[3]{D^3 - 7.64 V \tan A}}{2 \tan A}$ ..... ⑤

$h = Y - y$ ..... ⑥

Substituting ⑤ in ⑥ $h = \frac{D}{2 \tan A} - \frac{\sqrt[3]{D^3 - 7.64 V \tan A}}{2 \tan A}$

or, $h = \frac{D - \sqrt[3]{D^3 - 7.64 V \tan A}}{2 \tan A}$ ..... ⑦

Example, Fig. 1: D = 3", A = 10° and V = 7.218 cu in.

Substituting values in ⑦ $h = \frac{3 - \sqrt[3]{3^3 - 7.64 \times 7.218 \times 0.17633}}{2 \times 0.17633} = 1.176"$

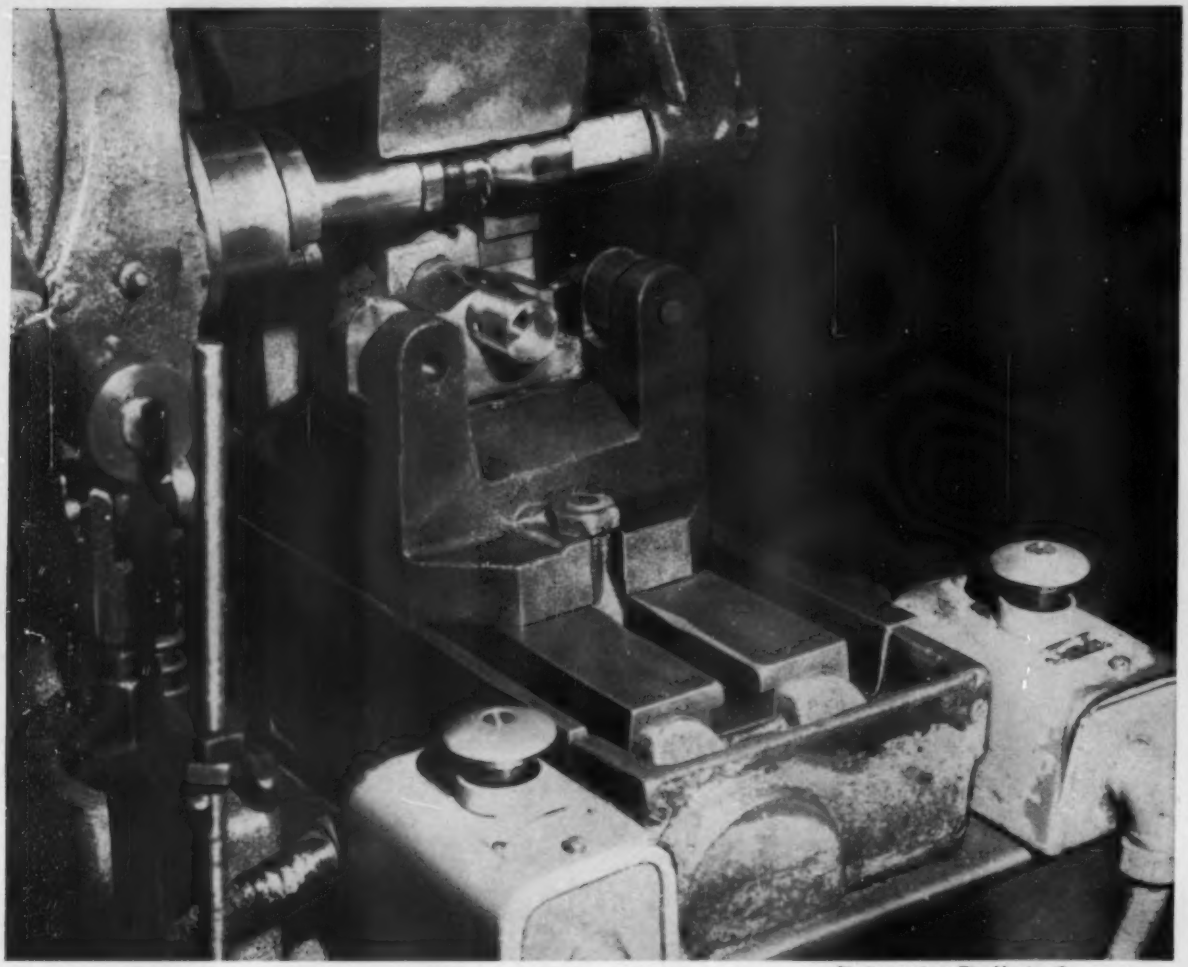


Photo courtesy The Maytag Company

Aristoloy Leaded 8620 cuts tool changes 50% on wringer drive sleeve for Maytag

Has working time been reduced? Yes.

In what way? The use of Aristoloy Leaded* has increased tool life and reduced downtime for tool changes.

Has machining been improved? Yes.

What inherent quality in the steel is responsible for improved machining? A more uniform, satisfactory microstructure provides better machining characteristics.

What operation is performed? Automatic screw machines bore, counterbore and cut off. Secondary operations include milling, drilling, internal and external grinding after carburizing.

For complete information about Aristoloy blooms, slabs, billets and bars, in carbon, alloy, stainless and leaded, call the Copperweld representative in your nearest large city—or write for NEW PRODUCTS & FACILITIES CATALOG.

*Inland Ledloy License

ARISTOLOY STEELS

DIVISION OF COPPERWELD STEEL COMPANY

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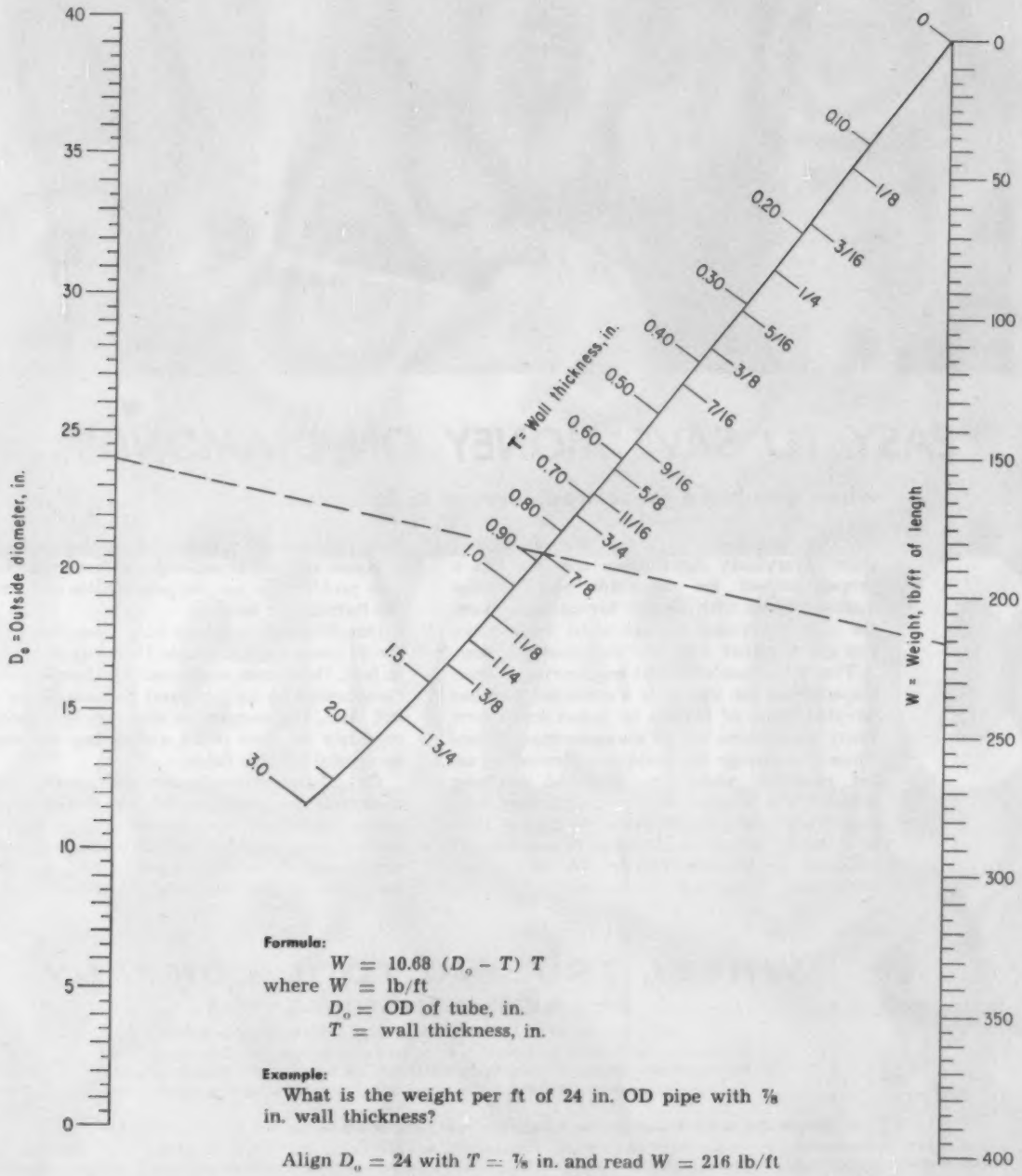
Weight of Steel Tubing or Cylinders

By F Caplan, design engineer, Kaiser Engineers, Oakland, Calif



Formula:

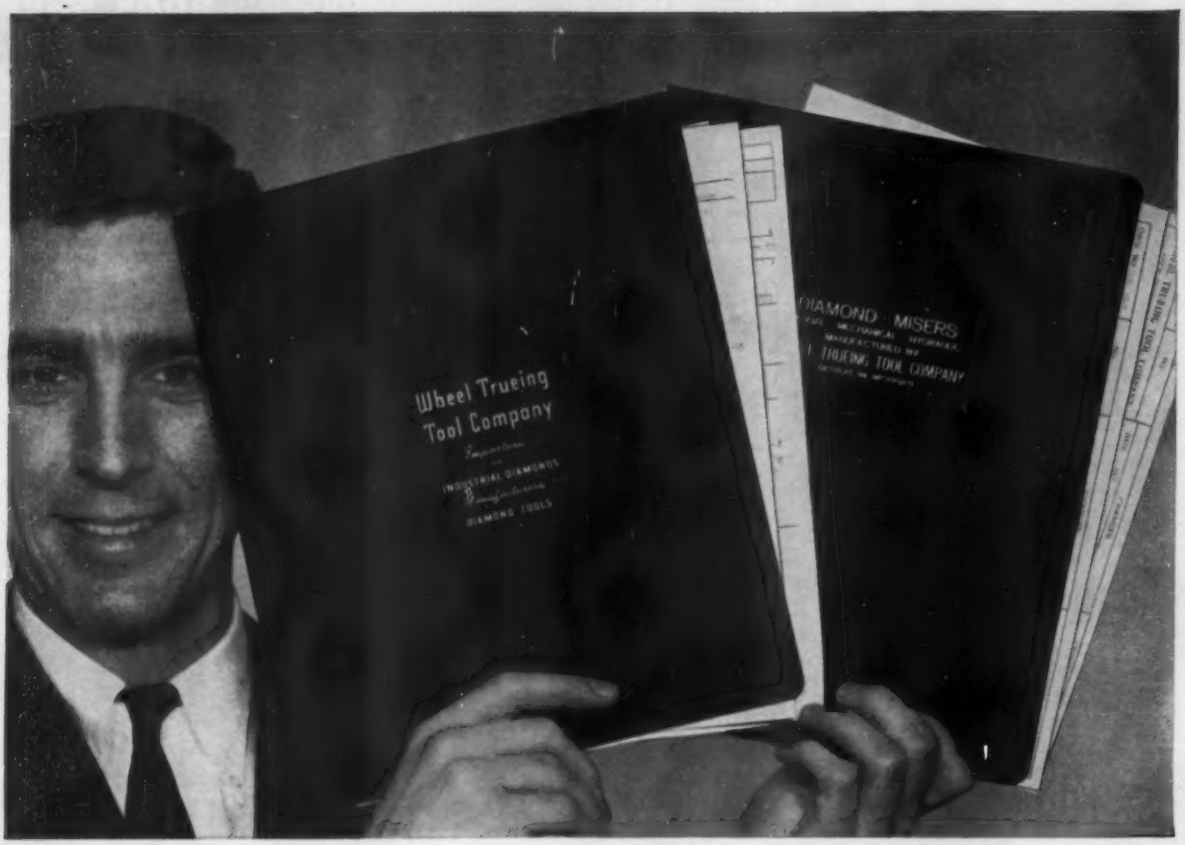
$$W = 10.68\ (D_o - T)\ T$$

where W = lb/ft
D_o = OD of tube, in.
T = wall thickness, in.

Example:

What is the weight per ft of 24 in. OD pipe with ⅞ in. wall thickness?

Align $D_o = 24$ with $T = ⅞$ in. and read $W = 216$ lb/ft



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That's because diamond engineering is such a specialized job that only a specialist who has devoted years of his life to it can know how many ways there are to make savings. Sometimes the savings are quite easily come by as, for instance, when the diamond engineer recognizes a familiar problem and knows from experience that a modification in type of tool, or a change in type of diamond, or a somewhat different application will do the trick. And, sometimes the savings are dramatic.

But, it takes the know-how of the diamond engineer and his experience and many production problems to see the possibilities and write the formula for savings.

Our diamond engineers have been doing this for 50 years—much longer than anybody else; in fact, these men originated the diamond tool "engineered to its job—and guaranteed to do it." And, the companies who use this service regularly to their profit are among the most successful in their fields.

Our diamond engineers will survey *your* diamond use and provide a money-saving recommendation without obligating you. If you're interested in cutting diamond costs, inventory, downtime, wheel costs, grinding costs, improving finish, etc., write us.

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NEW ALL-IN-ONE "MIG" WELDING EQUIPMENT

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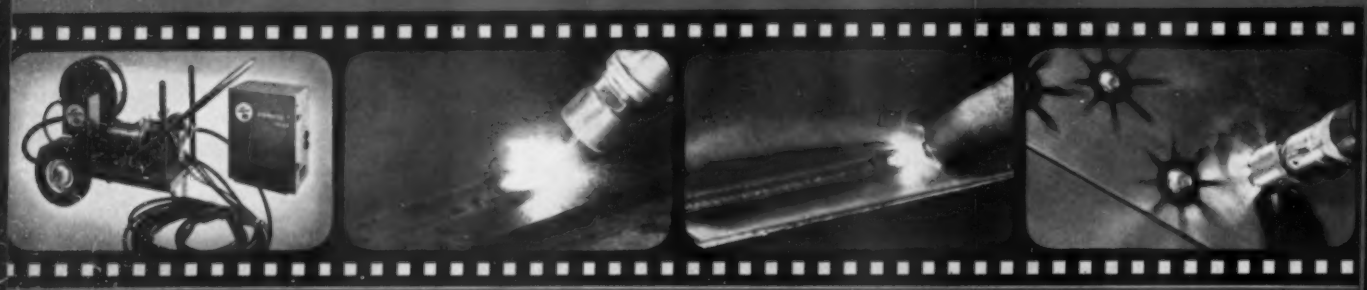
- **. . . all types of "Mig" welding—spray arc, short arc and spot welding**
- **. . . in all welding positions—vertical, overhead or downhand**
- **. . . with all shielding gases—argon, helium, CO_2, or their mixtures**
- **. . . and all wires—hard or soft, solid or tube**
- **. . . on all weldable metals—carbon steel, stainless, aluminum, magnesium, titanium**
- **. . . on all thicknesses—sheet metal and up**

See next page for details.

SIGMATIC



One SIGMATIC machine for... spray arc... short arc... spot welding

Spray arc, short arc, spot welding... never before combined in a single piece of equipment. SCC-8 control incorporates special spot-welding circuitry, featuring a directly-calibrated, precision weld timer and an independently-adjustable, "non-stick" timer. Converts from spot to continuous fusion welding at the flick of a switch. SEH-2 heavy-duty wire-feed unit—largest, most-rugged unit available today—permits positive feed of all "Mig" wire types, metals and diameters. The SIGMATIC line contains five basic units, designed with interchangeable parts permitting more than 50 combinations tailor-made to individual specifications. Available in cart-, sled- or bench-type units.

Unique controls are vastly simplified. All components are visible and accessible. Adjustments can be made with a screw driver. Only heavy-duty industrial-type parts are used throughout each unit to insure dependable, long-life performance with minimum maintenance. Top-quality parts—"Square D" pneumatic timers, Mallory electrolytic condensers, Cutler-Hammer switches, Potter & Brumfield relays, Electrons, Inc. thyratron tubes. The SIGMATIC line is unquestionably a major welding advance—with one rugged, durable machine, you can do any type of "Mig" welding in any position on any thickness of any metal. For more information or a live demonstration, call your nearest Linde office.

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LINDE COMPANY UNION CARBIDE

Division of Union Carbide Corporation
270 Park Avenue, New York 17, N. Y.

Talking Shop

Phone Hookup

BEST WAY to get attention at the Machine Tool Exposition this year turned out to be to put a railing around the machine with telephone headsets hanging on it. By picking up a phone, you could listen to a discussion of the machine's operations, sometimes taped and sometimes live. The noise level made it difficult to hear ordinarily and visitors evidently welcomed the chance to hear something clearly. Besides, the railing and headsets immediately suggested that here was a machine that the builder thought was something special. Kudos to Cincinnati Lathe and to Warner & Swasey.

Sell Production

PRODUCTION MEN have to sell their ideas to engineering if they expect to have an effective engineering-manufacturing relationship, according to R A Heddon, works manager at Allis-Chalmers. At the SAE Production Forum in Milwaukee last month, Heddon said that it isn't enough to "tell" engineering why certain design changes should be made, the production man has to accept the sales role and "sell" engineering on his point of view.

Double Lesson

THE HEAT WAVE during the first week of the Chicago shows last month emphasized a problem. With temperatures in some exhibit halls running well over 100 F and the humidity high, some of the electronic equipment became embarrassingly erratic. Some form of cooling for the control cabinets became essential, suggesting that this would be a good idea in any plant where temperature and humidity are likely to be high in summer.

A second lesson came when an unexpected power surge at the Navy Pier burned out relays on some rather expensive equipment. Electric companies are reported to be rather senstitive on the subject of voltage variation, and voltage drop is the more common problem, but if you are going to make use of electronic controls it may be well to include a voltage control in the system.

Show Report

IF YOU WERE among the readers who found our Sept 19 issue on your desk when you returned from the Machine Tool Exposition, the issue containing the 16-page summary of technical developments on view at the Chicago shows, you might be interested in knowing that it was the work of 14 of our editors. They studied every exhibit, analyzed and wrote copy at night (all night in one case). The printer operated on a crash schedule and editors and printer put the report on press while hurricane Donna was at her worst.

Cutting Fluid Test

AS A RULE, cutting fluid people have trouble displaying their oils at shows. Typical approach is to display the oils and rely on case history explanations to tell how they are used. When Mobil introduced Mobilmet at the Machine Tool Exposition, the display included a cutting fluid tester built by Research Appliance Co. Repeated tests were made of tapping operations in SAE 1020 steel with "Brand X" and with the new oil. The tester recorded torque required for each tapping operation and running accounts were kept on a blackboard.

Traffic Pattern

THE FLOW OF TRAFFIC followed pretty much the same pattern every day. The north end of the Amphitheatre would be crowded in the mornings, the south end in the afternoons. Most people started nearest the registration area and worked their way south through the halls. If you want to avoid the crowds in 1965, try walking quickly to the south end and working your way back to the entrance.

Plant Invasion

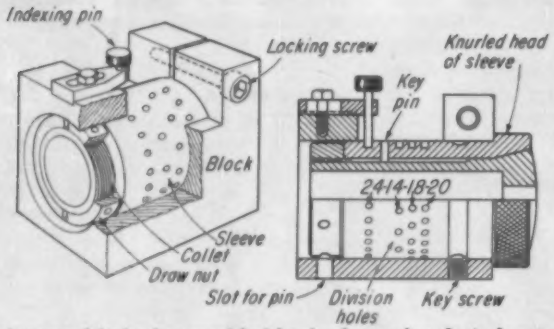
ON SATURDAY of the first week, Delco Remy sent nearly 700 people by bus to the Machine Tool Exposition. To emphasize the size of the delegation, all the members wore orange fezzes. By noon, they were so well distributed through the show (in contradiction to our theory of traffic described above) that they were lost in the crowds.

Air-conditioned Lunch

DURING THE HEAT WAVE some hundreds of visitors discovered a way to beat the heat in the restaurants. They would buy a sandwich and beer, then slip through the curtains into the balcony of the Arena. Here in quiet and air-conditioned comfort they could eat and look down on those exhibits in the Arena area.

Practical Ideas

Indexing Collet Block is Handy Workholder



A rugged indexing workholder is always handy to have around the milling machine or surface grinder. The one shown in the sketch is such a tool. It can be used vertically or horizontally on the magnetic chuck or in a milling vise, and because of the fact that it takes standard 5C collets, overall cost is reduced.

The major portion of the work is on the block itself and the indexing sleeve. This involved, for the most part, careful but uncomplicated boring, turning, and dividing-head drilling. Four radial rows of indexing holes provide 2-3-4-5-6-7-8-9-10-12-14-18-20 and 24 divisions. In addition to the block and sleeve, only four smaller parts are needed: A draw-nut to fit the collet threads, two adjustable index-pin plates, and an index pin completes the list of manufactured components.

Since this tool has been made to accept our 5C collets, all dimensions are proportionately relative. Other-size collets will, naturally, call for different dimensions.

After a block has been squared up for finish grinding to a 2.937 in. length, 2.750 in. height, and 2.312 in. width, a hole is bored centrally with the sides and 1.250 in. from the base. This bore, being 1.750 in. dia, is counterbored at the back end to receive the draw nut fully recessed.

A wide slot is next milled across the top of the block to provide access to the indexing sleeve. This is followed by reducing the height of the back section to 2.500 in. after which a ⅞ in. wide by 1/16 in. deep slot is made to take the index-pin plates. A 10-32 capscrew holds either plate in place.

The front section is slit, drilled and tapped, and fitted with a capscrew for locking the sleeve as positioned. This leaves but two operations to complete the block: The first is a slot through the bore for access to the draw nut with a pin. And the other is a tapped hole for a ¼-in. screw which acts as a key engaging a radial groove in the sleeve.

Once the sleeve has been machined to fit the base of the block and provided with a knurled head and radial groove, the bore is made to suit the collets. Four rows of holes, 24, 14, 18, 20 respectively, are drilled radially into the OD of the sleeve while it is held in a dividing head. An extra hole is drilled into the bore, between the 24 and 14-hole rows, and fitted with a pin which acts as a key to engage the collet keyway.

Two methods are provided for operating the draw nut. A pin, inserted through the slot in the base and into any of the six holes in the nut's periphery, will supply a good grip. And in the event the block has to remain as placed—on surface grinder or in vise—a spanner wrench to fit two slots in the end of the nut will be the tool to use.

The indexing-pin plates are made in two lengths. The short one takes care of the 24 and 14-hole rows, while the longer one reaches out to the 18 and 20 rows. A commercial dowel, mounted in a knurled head, makes a durable indexing pin.

Henry E Piltz, East Orange, NJ

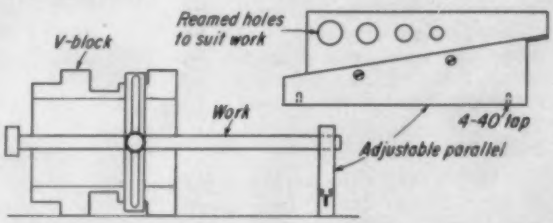
Adjustable Parallel Serves as Steadyrest

You know that adjustable parallels are invaluable, and sometimes indispensable, to the die maker or machinist. But, did you know that they can be used as steadyrests in supporting long, slender work for grinding or light milling?

In my shop, they are always used to support the extended end of such workpieces when they are to be ground into specially-shaped punches or ejector blades. Approximately ½ in. of stock is then allowed (later cut off) in excess of required length of work for nesting in the parallel.

Relatively little work is attached to preparing a parallel for this duty. A few holes of work diameters most often used are drilled and reamed perpendicularly through the male section of the parallel. A pair of 4-40 holes are also drilled and tapped in the edges of the female half so the parallel can be mounted on a riser if one should be necessary.

With these adjustments available, the work can be gripped in a number of holding devices; most notably, a V-block as shown, or a dividing head. Once the work



is mounted, the parallel is slipped onto the extended end and adjusted for maximum support without distortion. This is checked out with an indicator on a surface gage.

The machining operation is now carried out between the workholder and the parallel, rotating the dividing head, or flipping the V-block, as required on the completion of each face. After the excess stock has been cut off, the end of the piece is ground square to length.

Rolf Nygaard, Brooklyn, NY

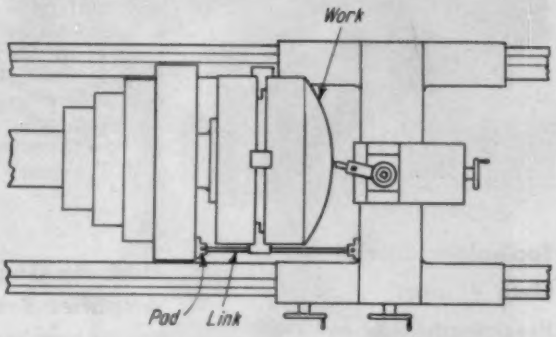
Semi-Permanent Fixture Guides Radius Turning

After trying several methods of turning a large radius on the end of a piece, we settled on the rig shown in the sketch. It is semi-permanent in the sense that the rod, which is made to suit the radius required, is the only part that needs renewal. Pads, into which the rod ends are pinned, can be left on the machine at all times without being in the way.

One of these pads is attached to the left side of the cross slide and the other to the headstock at the same level. When the two are linked together, a convex radius is described on the work as the cross slide alone is moved. Snug-fitting pins are used to eliminate error-causing slack.

Should it be necessary to produce a concave radius on the face of a piece, the tailstock serves as the stationary support for one pad. The other pad would then be attached to the right side of the cross slide.

The rods, or links, can be made from either round stock as shown or flat-bar material. The important



thing is that the pivot-pin holes are drilled at the exact center-to-center distance of the radius required on the workpiece.

E Prinsen, St Catharines, Canada

Taper-Reamer Stop Assures Accuracy

One of the most common mistakes in taper reaming is that the reamer either cuts too deep or not deep enough. The reason for this is that in almost every case taper reaming has become a cut-and-try operation. It need not be. Proper depth and uniformity of depth between successive pieces is easy to maintain if you use a stop like the one shown.

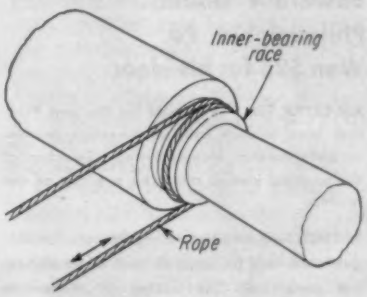
A tightly fitted collar, setscrewed to the reamer shank, carries an adjustable stop rod to completely eliminate guess work. The stop rod is a piece of drill rod cut to the required length and seated in a reamed hole in a boss on the collar. The rod is also locked in place with a setscrew after the proper depth has been found.

The depth can be set in either of two ways. First, and probably the most acceptable, is to carefully ream a prototype hole and then adjust the rod to bear on the face of the work. The second method would be to set the rod end at the diameter which corresponds to the largest required diameter of the hole when this size is known.

H J Gerber, Stillwater, Okla

Rope Trick Frees Bearing Race

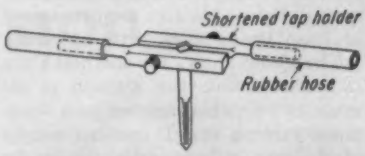
Sometimes a bearing may fail leaving the inner race firmly wedged against a shoulder on the shaft. Removing the race is difficult in some cases because there is no way to apply a puller. There may be the additional difficulty of being unable to force wedges between the race and shoulder, such as with delicately bal-



anced or precisely turned shafts.

I had considerable success with such removals by using a very simple process. The shaft is clamped and cleaned of all burrs. I then wrap a small rope or sash cord 1½ turns around the race, pull it tight and begin sawing the cord back and forth. Enough heat is quickly generated to expand the race without heating the shaft. As soon as the race begins to turn I quickly slide it off the shaft. The race will be hot so be sure to wear gloves.

B M Fudge, Bethesda, Md



Hose Softens Tap-Wrench Pull

Admittedly, I've always had a heavy hand when tapping holes with the result that I have an unenviable tap-breakage record. No matter how I tried, I could never develop the sensitivity necessary to know when to stop pulling before a tap would break.

This problem is no longer mine however as I have eliminated my shortcoming with the aid of a simple device. It consists of replacing the customary rigid tap-holder handles with torque-absorbing rubber hose.

After shortening the handles, I slipped sections of rubber hose on each, long enough to extend a couple of inches beyond the ends. Now, while tapping, I push against the hose tips instead of the handles. If the tap binds, the hose bends and takes up the torque, avoiding breakage.

Maury Downs, Huntington Park, Calif.

Practical Ideas

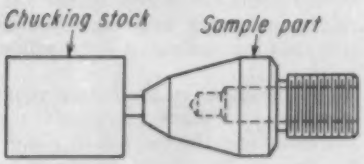
Toolholder Carries Own Wrench

Headless setscrews and socket-head screws have made the hex wrench an invaluable and convenient tool to have around. It is the wrench probably more relied upon by the toolmaker than any other in die construction and in the operation of some of his own tools.

But it has other capabilities; that of easily getting lost, or mixing in with others of nearly the same size. For these reasons, they are sometimes tough to keep track of and spring clips or the like are often used to keep the wrench with the tool.

The photo shows the method I use in making sure the wrench is always handy when needed on a shop-made turning tool. It consists simply of drilling a hole (slightly larger than the dimension across the hex points) into the back end. The long leg of the wrench is then minutely bent to grip in the hole.

Bob Magda, Port Monmouth, NJ



Sample Reduces Setup Time

When production runs are small and setup time an important factor, the screw-machine setup man can be greatly aided by a sample part from a previous run. A sample will also eliminate those 'gross' errors which sometimes occur through haste. When small runs come up with any degree of frequency, the effort spent on making and storing a sample will prove to be well invested.

The sketch illustrates a typical example. Here drilling, boring, threading, and contour turning have been performed to close limits, but before cutoff has been completed, a piece of the stock is allowed to remain attached. In future setups, the sample is gripped in the collet by the stock, after which all tools are checked out as to location and depth.

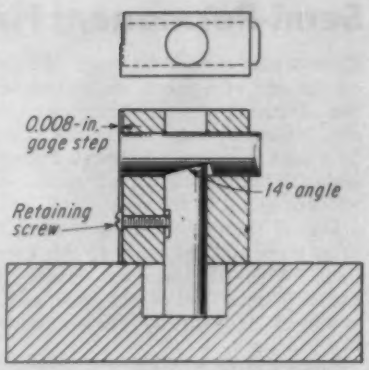
M W Loftus, Chicago, Ill

Flush-Pin Gage Amplifies Reading

The flush-pin gage, as it's commonly used, is a rather coarse-reading instrument, the operator depending entirely on his feel. This is because it's a direct motion application usually not practicable where the limits are less than ±0.005 in.

The sketch shows a refinement of such a gage which allows inspection to ±0.001 in. and sometimes less. Two pins, vertical to each other instead of a single straight-through pin, make this possible. The two contact each other in a whistle notch on the horizontal pin which produces a 4 to 1 differential ratio. In other words, a 0.004 in. motion of the horizontal pin moves the vertical 0.001 in.

Generally, the block is made in the same way as on a regular gage, with a vertical through hole. The only



other additions are a horizontal hole of the same diameter near the top edge, and a tapped hole for a retaining screw. A whistle notch is milled at 14° (more specifically, 14° 2' 10") in the center of the horizontal pin. The top end of the vertical pin is milled or ground to match the angle of the whistle notch. Rotation is prevented by the retaining screw engaging a flat on the vertical pin.

Assuming the limits to be ±0.001 in., an 0.008-in. step is ground on the end of the horizontal pin in the same manner as on the conventional gage pin. Any error will now be amplified to such an extent that the operator should have no trouble in detecting it.

Ernest J Goulet, East Haven, Conn

Edward V Quinn
Philadelphia, Pa.
Won $25 for his idea:

Drill Subs For End Mill
in the July 11, 1960 issue

AN EXTRA $25 will be paid for the best Practical Idea in each issue of *American Machinist/Metalworking Manufacturing*. Selection of the winning idea is made by a group of our readers.

PAYMENT—in addition to regular rate for item published—will be made as soon as tabulations are completed. The winner or winners—in case of a tie when duplicate prizes will be awarded—will also be announced in these pages.

JUDGES . . . are a group of *American Machinist/Metalworking Manufacturing* readers who select articles they prefer in a particular issue. This group changes entirely with each issue and represents a true cross-section of our readers. Their decision is accepted by the editors, without reservations or bias, as final in each case.

REQUIREMENTS—All items appearing in the Practical Ideas pages are eligible. They must be submitted by the originator on an exclusive basis. Do not worry about your shortcomings as an author, draftsman, or photographer—every item will be edited in accordance with *American Machinist/Metalworking Manufacturing* standards. Readers will judge only the finished product—in terms of its usefulness to them.

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HOW TO ENTER—Send all entries to: "Practical Ideas Editor" *American Machinist/Metalworking Manufacturing*, 330 West 42nd Street, New York 36, NY.

Joseph E Adams

. . . is by profession a manufacturing engineer, by avocation a cinematographer, and by conviction a champion of American industrial supremacy.

A sounder of warnings against the growing inroads of foreign competition, he is a . . .

Man with a mission

Joe Adams, executive VP of Cleveland's White Motor Co, is a man who is as much at home on the working end of a 16-mm movie camera as he is in his walnut-paneled office.

To Joe Adams the camera is a weapon of truth. With it, he points up the message that he has been pounding home to American industry since 1949:

"We in the United States no longer have a monopoly on quantity production, advanced-design machines, quality, and automation. Improvement in European know-how, plus a wage-differential advantage, is now making itself evident throughout the world. American products were predominant in many countries before and immediately after World War II . . . today they are in second-best position."

Adams knows whereof he speaks. A traveler since he was 12 (he's an athletic 47 now), he has been observing and photographing Europe's industrial renaissance for more than a decade now: "It's our responsibility to tell others what we've seen and learned of foreign economic growth. That's why I've used the movie camera—to try to convince people of what I've seen in factories and plants all over Europe."

Adams' latest production, which he filmed during a 1958 journey abroad, is a sound-and-color "philosophy on film" that he calls "Europa and the Goddess." It's described by producer — director — script-writer Adams as a journey through the past to the present: Europe in pre-history and Europe in the present, with historical parallels along the way.

The movie has been so popular in its showings to private audiences in theaters, schools, and museums that Adams has withdrawn it from circulation. "I want to preserve it, and it's getting pretty worn," he explains.

To his business-pleasure camera work, Adams brings the same tenacity and drive that he applies to his job as executive vice-president in charge of manufacturing and development at White. His knowledge of history, Europe, and Europeans complements his acquired skill in photography. At the same time, his wide experience in industrial problems enables him to bring his chosen subject matter into perfect focus. (Before his work at White, Adams was one of the founders of International Molded Plastics. During World War II, he was special assistant to the vice-chairman for production in the War Production Board.)

These traits combine to put Joe Adams in this unique position of trying to explain to others why it's important to come to grips with foreign competition.

But it's not only through movies that Adams tells his story. He's served two terms as vice president of SAE, and he delivers the same message in the many addresses he's called upon to make. One of these talks, made before the National Production meeting of SAE in Cleveland last March, was widely quoted across the country. The former college (Carnegie Tech, BSME, '34) editor and post-college radio announcer writes his own speeches, and admits he welcomes the opportunity to discuss problems that America faces.

In that SAE talk, Adams spelled

out explicitly what ails us, in his opinion. He noted the still-present Horatio Alger philosophy to which European youth subscribes, and compared it with the demands for the "good life" inherent in Americans.

But Adams — no ivory-towered critic of the modern scene—has several concrete remedies for modern ills. He's got a fundamental belief that American industry must hold to the present standard of living—without compromising quality of product—while permitting the rest of the world to catch up with us. He's against high tariffs, for example, because he feels that as a means of protection tariffs solve neither political nor practical problems. He's said before that our objective must be to bring down European trade barriers to equal ours, so that an additional burden is not placed on our already-high prices.

The Adams plan for countering our problems and the threats to our economy—and what he tries to say on film—can be summed up in three short words: go to work. He describes his three-sided solution this way:

"We have three objectives, I think. We have to put a stop to inflation. We must increase our productivity by going to work and producing what we are capable of producing, so that we can reduce the actual cost of our product. And we've got to go to work to make it right the first time, so our reputation for quality stays high in the market places throughout the world."

Adams, who has been with White since 1944 (when he joined the company as production-control manager), went up through the manufacturing ranks of the company and became exec VP last year. He's just returned from a four-country business trip through Sweden, Great Britain, France, and Germany (where he admits he managed to find time to shoot a few thousand feet of sound film). While overseas he had another first-hand opportunity to observe European manufacturing facilities and to reaffirm his convictions on the Europeans' drive for increased production.

Right now, Adams is trying to find enough time to study the footage for his next sound production. Besides his duties at White, he devotes a great deal of time to his wife and family (son Steve, 14, and daughter Gail, 8) and to community activities. Adams is on the board of Cleveland's first inter-racial hospital (Forest City Hospital), the Musical Arts Association (which sponsors the Cleveland Symphony Orchestra), and the financial board of Fenn College.

Nobody who knows him doubts that he'll be able to find the time. For trouble-shooting, dynamic Joe Adams, jamming 48 hours into a 24-hour day is all in a day's work.

Chance Vought, Aircraft, Dallas, has named **Gifford K Johnson** executive vice president. He was formerly vice president, production, and for the past year and a half has also served as vice president, business planning, active in much of the preliminary study that went into Chance Vought's moves into diversified fields

E W Bliss Co has named **Charles E Peterson** division manager in charge of the **Mackintosh - Hemphill Division,** Pittsburgh. Previously manager of manufacturing operations, he succeeds **J R Patterson,** formerly vice president in charge of the division, and now president and chief executive officer of Bliss

Rotor Tool Co, Cleveland, has named **Robert Allchin** president. Formerly director of marketing, he succeeds **H P Bailey,** company founder, now board chairman

Erie Forge & Steel Corp, Erie, Pa, has elected **Homer Clarkson Lackey** president and chief executive officer to succeed **A R Gaus** who has retired. Mr Lackey was formerly manager, forged steel products, US Steel Corp.

Budd Co, Philadelphia, has appointed **John W Allen** manager, engineering, non-destructive testing, of the Instruments Division at Phoenixville, Pa. Mr Allen was formerly in charge of the Non-destructive Testing Laboratory of the Metallurgy Division of the Atomic Energy Commission's Oak Ridge National Laboratory.

Bucyrus-Erie Co, South Milwaukee maker of construction machinery equipment, has named **Eugene P Berg** executive vice president. Mr Berg was formerly general manager of Chicago operations for Link-Belt.

Cleveland Cap Screw Co has appointed **Herbert D Burdick** general sales manager. He was previously assistant general sales manager.

Rotor Tool Co, Cleveland subsidiary of Cooper-Bessemer Corp, Mount Vernon, Ohio, has announced the retirement of **D S Linton,** vice president and general manager. **L W Dwors** has been promoted from works manager to vice president, manufacturing. **Hugh L Whitehouse,** chief product engineer, has been appointed director of engineering. **Paul Van Sittert,** chief development manager, is now director of research.

General Electric Co has appointed **Ernest S Frens** manager of manufacturing engineering at the Schenectady Foundry Department. He has been serving as a casting design engineer there.

Gleason Works, Rochester, NY, machine tool manufacturing company, has promoted four men in its engineering department. **Oliver F Bauer** (left) has been named chief designer of the Auxiliary Machine Group, responsible for units not directly used in gear-making, such as lappers, testers, and hardening machines. **Earl D Dammert** (center) has been appointed chief designer of the Universal Machine Group, concerned with jobbing machines, such as generators and grinders. **Herman A Male** (upper right) takes over the post of chief designer, Production Machine Group, in charge of high production units, such as automatic loading machines. **Philip H Goeltz** (lower right) has been made chief standards engineer responsible for standard design practices in mechanics, electricity, and hydraulics

Ellison Machine Co, Los Angeles, has announced that **J O Ellison,** owner of the company, and formerly vice president, has resumed the helm position. He will continue to actively manage **Barron, Rickard & McCone Co** of Northern California at San Francisco. **Charles M Letz,** recently elected vice president and general manager of Ellison Machinery, will be in charge of operations there.

Penn Machine Co, Pittsburgh, has appointed **E Lincoln Van Sickel** assistant to the executive vice president. Formerly a Pittsburgh representative of the Tool Steel Gear & Pinion Co, Cincinnati, Mr Van Sickel will be engaged primarily in sales of precision metal parts.

Remington Rand Division of Sperry Rand has announced that **Robert D Brown,** vice president and general manager of the Remington Rand Systems Division has been named to the same capacity in the Office Machines Division. **Francis V Bergren,** formerly director of marketing for the Systems Division, has been promoted to vice president and general manager of that division. **Howard V Widdoes** is now attached to the group headquarters staff as vice president handling special assignments.

Bostitch Inc, East Greenwich, RI, has appointed **Claude Schuler** general manager of the Stapling and Stitching Division. He has been serving as national sales manager.

Philips Electronic & Pharmaceutical Industries Corp, Mount Vernon, NY, has named **Robert T Cavanagh** general manager of **Philips Electronic Instruments Division.** He moves up from the post of assistant general manager.

National Bureau of Standards has appointed **G Franklin Montgomery** chief of the Instrumentation Division, recently established at the Washington laboratories. **A G McNish** has been named chief of the Metrology Division which replaces the Optics and Metrology Division. **Dr D P Johnson** has been made chief of the Mechanics Division's new Pressure and Vacuum Section.

(Continued on p 212)

Clearing Division of US Industries Inc Chicago, has appointed **Henry M Crossen** vice president, manufacturing. He was formerly director of manufacturing

National Electric Welding Machines Co, Bay City, Mich, has elected **Simon Fisher** president to succeed **Edward C Smith** who will now serve as chairman of the board. Mr Fisher will continue to serve as general manager

OBITUARY

Walter P Schmitter, 62, engineering vice president of the **Falk Corp,** Milwaukee, Wis, died Sept 5 after a long illness. A nationally known engineer, and associated with Falk since 1924, Mr Schmitter was active in the formulation of gear practices and standards for the American Gear Manufacturers Association and the American Petroleum Institute. The Schmitter Rational Gear Formula was proposed to AGMA in 1934 and was later adopted as the standard of the industry.

NEW BARDONS & OLIVER No. 6 RAM TYPE TURRET LATHE

- 3 INCH COLLET CAPACITY FOR HEAVY DUTY BAR WORK
- 5 INCH COLLET CAPACITY FOR LIGHT DUTY BAR WORK
- 21⅛ INCH SWING OVER BED WAYS

New bed, headstock, tool carrying units and aprons are properly proportioned and integrated to produce a truly functional lathe. It offers greater metal removal capacity, while holding today's most demanding tolerances!

In the design of this lathe, the operator was not overlooked. The number of operating controls has been reduced—grouped by function—scientifically located within easy reach. Generous use of aluminum and redistribution of weight results in improved balance and freer traverse of tool carrying assemblies.

For more information on how the new No. 6 can speed up your machining operations and build increased profits, contact the nearest Bardons & Oliver representative or write directly to our home office.

Bardons & Oliver, Inc., 1633 West 9th Street
Cleveland 13, Ohio

NO. 6 FEATURES

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- Single Dial Feed Selectors on both aprons
- Power Rapid Traverse to the cross slide

BARDONS & OLIVER

Manufacturers of Turret Lathes and Cutting-Off Lathes

CIRCLE 242 READER SERVICE CARD

Anaconda Copper-Nickel-Silicon Alloy Has Qualities of Silicon Bronze

Cunisil-837, an alloy of 97.50% copper, 1.90% nickel, and 0.60% silicon, is a high-strength, corrosion-resistant material that includes many of the desired qualities of silicon bronze or Everdur. It is intended for certain end uses where its particular combination of physical, mechanical, and fabrication properties is needed, such as in electrical equipment.

The alloy has high electrical conductivity (30-42% IACS as heat treated) and excellent cold-forming characteristics before the hardening heat treatment. Compared with Free-Cutting Brass Rod at 100, its machinability rating is approximately 40. It is made in round rod, with or without the final precipitation-hardening heat treatment as follows: straight lengths including 3/16 in. dia to 1 in., dia, and coils including 3/16 to ⅝ in. dia. Mechanical properties for the above size ranges in the precipitation-hardened condition are: tensile strength (min) 90,000 psi; yield strength @ 0.50% extension under load (min) 70,000 psi; elongation in 4 x D (min) 8%; bend test, angle of bend (on radius equal to dia) 90°.

Anaconda American Brass Co, Waterbury, Conn

MORE DATA? Circle 103, inside back cover

New Technique "Welds" Nylon To Metal at Room Temperature

A new two-step process for chemically "welding" nylon to metal is expected to find widespread use in such applications as the bonding of nylon gears to metal shafts, or the securing of threaded screws or rods in nylon-and-metal assemblies (above). In such applications in the past, the self-lubricating nylon has generally required a complicated mechanical interlock arrangement to prevent slippage between nylon and metal.

The new chemical welding method, however, makes use of an epoxy paste that chemically unites with the metal surface on which it is applied. A separate solvent solution applied to the nylon part softens the surface and allows the nylon molecules to blend with the epoxy bonding agent as it hardens.

The entire operation is performed at room temperature, but a tough, shock-resistant union between nylon and metal is obtained in a few hours.

The two materials used in the system are supplied in separate containers. The nylon treating agent, called PA-749, is a single-component material which costs $4.75 per lb in one-pound bottles. The two-component bonding agent, PA-708, is supplied either in bulk or in disposable packettes.

Plastic Associates, 2900 S Coast Blvd, Laguna Beach, Calif

MORE DATA? Circle 104, inside back cover

Coatings Protect Metal Exposed To Corrosives or 1400 F Heat

Line of silicone and silicone-ceramic heat resistant coatings for maintenance and OEM use is designed to protect metal at constant heat at all temperatures to 1400 F as well as in service requiring resistance to varied and severe corrosive environments.

These ten new Dampney High-Temperature Coatings cover the entire temperature range from low through moderate to extreme high heat, air dry or heat cure in service, and are available in any color as well as aluminum. Anticipated use determines choice. Basic factors determining selection are actual skin temperature of metal, normal and peak, and rate of heat rise; corrosive environment; and atmospheric exposure.

Dampney Co, Hyde Park, Boston 36, Mass

MORE DATA? Circle 105, inside back cover

Dry Lubricant, in Stick Form, Doubles Cutting Tool Life

A dry lubricant stick, composed of resin bonded molybdenum disulfide, permits easy application of a lubricating film to cutting and shaping tools, sliding areas of small and medium size machine parts, or wherever metallic dry friction occurs on sliding surfaces. The stick is just rubbed firmly over the cleaned surface.

However, according to the manufacturer, cutting tool life is more than doubled when the Molykote is properly applied. It has been used to advantage in Europe on taps, dies, gear shapers, planers, and milling cutters, where no cutting fluid is used. The Molykote sticks are also said to be useful on small surfaces where oil cannot be used because of contamination or temperature restrictions.

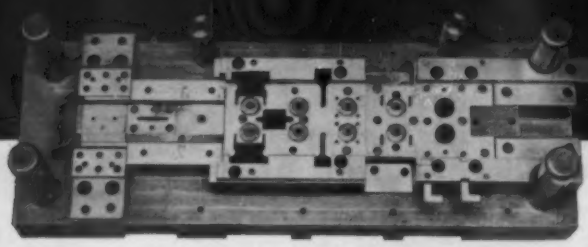
The Alpha-Molykote Corp, 65 Harvard Ave, Stamford, Conn

MORE DATA? Circle 106, inside back cover

US Steel Makes Thin-Gage Strip And Sheet From Toughest Steels

Thin-gage sheet and strip, made from some of the toughest steels now available, is now being produced by U S Steel Corp. By making these steels available in light-gage forms, the way is open for the creation of stronger, yet lighter-than-ever designs in new commercial, industrial, and military applications, the company reported.

Size limits for the full product mix to come from a modernized continuous plate quenching and tempering line at Homestead, Pa, will depend on production experience. Tentative



no.484 gives you perfect balance between hardness and toughness...

This Type A-2 air-hardening tool and die steel is especially suited for applications in which the sections are very large... and those involving extreme accuracy of size and extreme hazards in hardening. Easy to machine... with excellent non-deforming properties ...Carpenter No. 484-FM provides fast, simple, safe handling at every step. It is also made by the exclusive MEL-TROL® Process to assure order-after-order uniformity. Use this MATCHED SET of Air-Hardening Tool and Die Steels—Vega-FM (Type A-6), No. 484-FM (Type A-2) and No. 610-FM (Type D-2)—for proper selection and predictable performance. Call your Carpenter SERVICE-CENTER for prompt delivery.

Carpenter steel

you can do it ***consistently*** better with Carpenter Tool and Die Steels

The Carpenter Steel Company, Main Office and Mills, Reading, Pa.
Alloy Tube Division, Union, N. J.
Webb Wire Division, New Brunswick, N. J.
Carpenter Steel of New England, Inc., Bridgeport, Conn.

objectives, however, call for thicknesses ranging from 1/10—¾ in., widths from 15—96 in., and lengths up to 360 in. Plates, sheet, and strip will be furnished in flat form only, not in coils.

U S Steel Corp, 525 William Penn Place, Pittsburgh 30, Pa

MORE DATA? Circle 107, inside back cover

Line of Ceramic Parts Offered For Use at Temperatures to 2100 F

Stock line of ceramic parts including bushings, washers, rods, discs, plates, and V-blocks is available for use in both equipment and tooling. The material used in these components is a high temperature ceramic with excellent thermal shock resistance. The parts can be modified for use in both development and production work by grinding with silicon carbide wheels or ultrasonic hole drilling.

Duramic Products Inc, 426 Commercial Ave, Palisades Park, NJ

MORE DATA? Circle 108, inside back cover

Alloy Developed for Use At Temperatures to 2300 F

Supertherm, with superior high temperature properties and good foundry and weldability characteristics, is available as static, centrifugal, and shell-molded castings. Tensile strength (psi) in the temperature range of 1800 F to 2300 F is 21,700 to 2100. Yield strength (psi, 0.2% offset) is 17,100 to 1500.

Composition is Cr, 26%; Ni, 35%; C, 0.50%; Mn (max), 0.70%; Si, 1.6%. This composition is strengthened and stabilized with cobalt and tungsten, a key to its exceptional capability.

Electro-Alloys Div, American Brake Shoe Co, Elyria, Ohio

MORE DATA? Circle 109, inside back cover

Improved Superalloy Has Superior High Temperature Strength and Ductility

Newly improved WI-52 cobalt-base high-tungsten superalloy has good ductility and corrosion resistance as well as greatly improved high temperature strength in the 1800F range. Refining techniques and precise control of the important alloying elements make the difference.

Acceptance tests at 1800F and 15,500 psi, on 10 recent production heats, show an average stress-rupture life of 73 hr, which is 18% more than in previous alloy variations. In the same tests, average stress rupture elongation in 1-in. was 17%, an increase of 160%.

This superalloy contains 20% chromium and small additions of columbium. Carbon, manganese, silicon, nickel, and iron contents are critical to insure the full development of elevated temperature properties. Phosphorus and sulfur are limited to a maximum content of 0.04% each.

WaiMet Alloys Co, 5320 Oakman Blvd, Dearborn 2, Mich

MORE DATA? Circle 111, inside back cover

Process Protects Brass and Brass-Plated Steel From Corrosion

Corrosion-protective system known as the Lacqua Process involves a simple wetting of the metal surface by dip or other means with a nonflammable water-thinnable material, Lacqua M-800. In tests, the material applied to brass-plated steel passed 96-hr salt spray exposure. Major competitive systems based on baking enamels, lacquer, and water soluble finishes varied from slight to severe corrosion following 24-hr exposure.

The system can be used for intricately-shaped pieces as well as large flat areas. It can be used without special equipment and is supplied ready for thinning. When used in plating, water wet parts coming directly from a water rinse following the plating operation may be dipped in the Lacqua M-800 eliminating intermediate drying or use of precipitating solvents.

Bee Chemical Co, Logo Div, 12933 S Stony Island Ave, Chicago 33, Ill

MORE DATA? Circle 112, inside back cover

New Phospating Compound Does Simultaneous Cleaning, Plating

Paintite—which does simultaneous cleaning and phosphating of iron, steel, and zinc—has been developed to meet the needs of more than a thousand metalworking plants.

The compound, which can be applied by immersion, spray washer, or steam cleaner, produced a light up to 70 mg/sq ft, tight, smooth, and uniform phosphate coating.

Turco Products, Inc, 24600 S Main St, Wilmington, Calif

MORE DATA? Circle 113, inside back cover

Stressproof Steel Bars Offered in New Sizes

Stressproof steel bars are now available in diameters up to 4 in. The same high physical properties are held in the larger sizes; high strength without heat treating, 100,000 psi yield, is maintained. When used in place of most other steels of equivalent strength, Stressproof is said to increase machining rates from 50 to 100%. It is rated at 83% of B1112.

La Salle Steel Co, PO Box 6800-A, Chicago 80, Ill

MORE DATA? Circle 114, inside back cover

Deburring Compound Announced

A new deburring compound, Oakite FM 182, combines moderate alkalinity with abrasives to deburr metals in tumbling barrels. The compound, containing a 40 to 80-mesh abrasive, has no adverse chemical action on metals; in fact, it often enhances the color of the pieces.

Oakite Products, Inc, 124 Rector St, New York 6, N Y

MORE DATA? Circle 115, inside back cover

3M Epoxy-Resin Adhesives Cure At Room Temperature, Contact Pressure

Three new high-strength two-component modified epoxy resin adhesives that cure at room temperature under contact pressure are designated as Scotch-Weld Brand structural adhesives EC-1751, EC-1838, and EC-2054. They are designed for high strength metal and plastic structural bonding applications where heat and/or pressure are not feasible.

All of the adhesives maintain high-strength properties over a service temperature range of –67 to 160 F. Shear strengths of metal-to-metal assemblies bonded with these materials range from 2300 to 3200 psi at 75 F service temperature. Features include high creep resistance under constant stress, exceptional adhesion to metals and plastics, and good resistance to water, hydraulic oil and aromatic fuels. Their excellent self-filleting properties make them highly useful for honeycomb sandwich construction.

Minnesota Mining & Mfg Co, 900 Bush Ave, St Paul 6, Minn

MORE DATA? Circle 110, inside back cover

FIELD PROVEN...

Honeywell Electro Hydraulic Tracer Systems

Now operating on a wide variety of well-known machine tools (some of them illustrated at the right), Honeywell 180° and 360° Tracer Control systems provide fast, accurate and reliable system response for smooth application of large increments of hydraulic power.

They combine the flexibility, remote control and finesse of electronics with the power and fast actuation of hydraulics. They're far more flexible than completely hydraulic systems. These systems have been designed for ease of application. Modular construction simplifies and speeds field service.

Accuracy—Accuracies of ± .0005" from template to part and ± .0002 from part to part have been achieved in actual use.

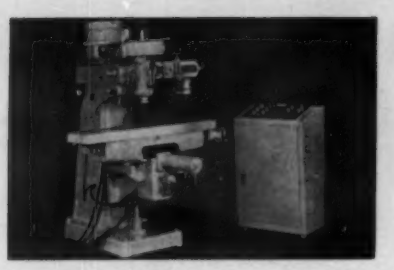
Adaptability—These systems are now in operation on all types of machine tools, from light duty engine lathes to huge spin forging machines. Every application is custom fitted—at production line prices.

Performance—Each Honeywell system becomes an integral part of the machine tool. The control system can be adjusted to compensate for changes in machine performance during the life of the machine. Speed range of 300 to 1 is normal; greater rangeability is available on some applications. Tracing speed ranges up to 60" per minute are available.

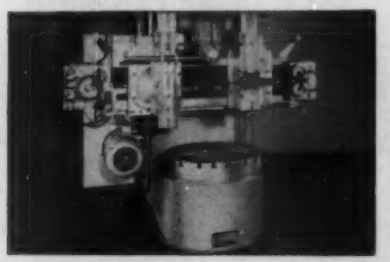
For further information on Honeywell's new machine control systems and components and their application to your specific job, contact Minneapolis-Honeywell, Machine Control Group, Dept. AM-10-93, Minneapolis 8, Minnesota.

Honeywell

H HONEYWELL *First in Control*



Gorton Vertical Milling Machine equipped with Honeywell 360° Electro Hydraulic Tracer Control System.

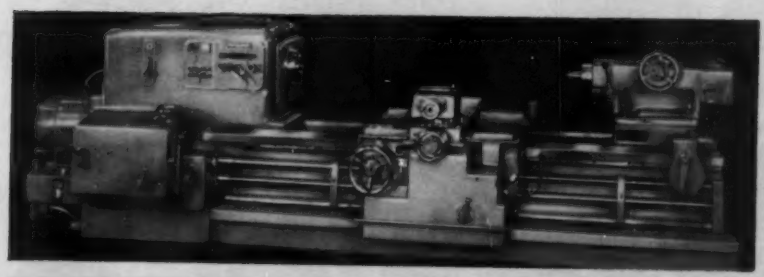


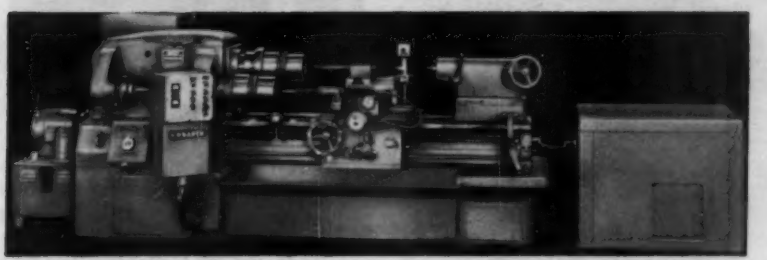
Giddings & Lewis vertical turret lathe with Honeywell 360° Electro Hydraulic Tracer Control System.

Frauenthal Division of Kaydon Engineering Corporation turning and grinding machine with Honeywell 180° Electro Hydraulic Tracer Control System.

Rockford Machine Tool Company hydraulic mill with Honeywell 180° Electro Hydraulic Tracer Control System. Swarfing operation.

Hufford Corporation spin forge machine with *two* Honeywell 360° Tracer Control Systems plus spindle speed control.





Monarch Introduces Three New Lathes And 360° Electro-Hydraulic Tracer System

Featured at the Monarch booth at the Machine Tool Exposition were the Series 91 Dyna-Shift heavy-duty lathe (top); a 360°, two-axis, electro-hydraulic tracer system (center); a rotary profile tracer lathe (bottom); and a Series EE variable-speed lathe (not illustrated).

Heavy-duty lathe

The Series 91 Dyna-Shift heavy-duty lathe has the weight, power, and general features for metal removal limited only by the tool and the characteristics of the workpiece. Major feature is the headstock. With it the operator works in terms of surface cutting speed; the machine automatically calculates the proper rpm and sets up the shift. One dial is set for work diameter, the other is set for surface speed.

Speeds range from 6 to 750 rpm in 36 steps. Main drive motor is in 40-60 hp range, with drive to headstock through V-belts.

Bed way design provides chutes which lead chips into an open pan at rear, thus simplifying chip removal. End gear train and gear box are totally enclosed. A total of 48 thread and feed changes are available.

The Series 91 is offered in three models, 4025, 4025-31, and 4025-36.

Universal tracer

The 360°, two-axis electro-hydraulic tracer, known as the Electro-Gage Tracer, is shown here in a Series 91-Dyna-Shift lathe. The tracer head has a variable reactance device that sends signals to an electronic control console for interpretation and amplification. Modulated signals from the console provide electro-hydraulic servo valve control for regulating oil flow to the hydraulic motors. Electronic equipment consists of fully transistorized plug-in modules.

Carriage motion is powered by a hydraulic motor connected through a feed and traverse gear box to the leadscrew. Selection between the feed and traverse gear trains is by electric clutches. Another hydraulic motor, mounted on the rear of the carriage, is connected through feed and traverse gearing to the cross-feed screw. Tracing system can only be applied on new lathes at factory.

Tracer Lathe

Rotary profile tracer lathe is basically a Monarch 612. It is designed primarily for the boring of bottle molds having non-circular cross-section, but can be used for conventional turning, boring and threading. Maximum tracer slide stroke at one setting is 4 in. A female or male master can be used, and because of the light stylus pressure (1½ oz), non-metallic materials may be used for masters.

Variable-speed lathe

The Series EE, Model 1000, is a 15-hp, variable speed lathe equally suited for manufacturing or toolroom use. It swings 16 in. over the bed, 8¾ in. over the cross-slide, and is available in 30-in. and 54-in. center distances.

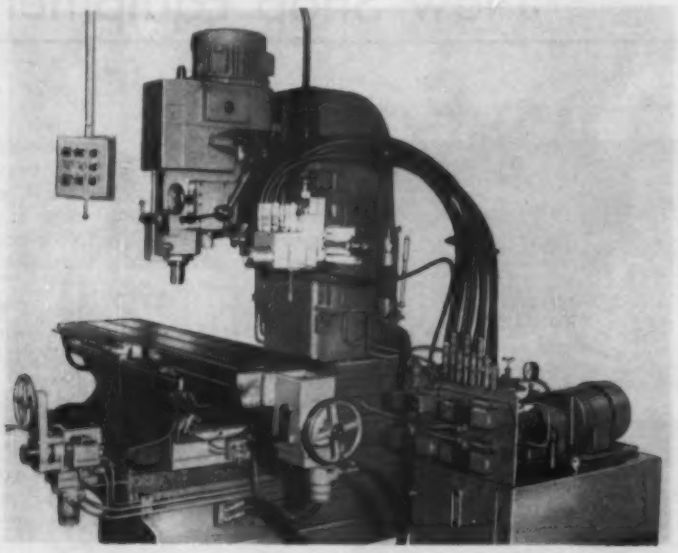
Speeds are infinitely adjustable, forward or reverse, from 20 to 2000 rpm. There are four speed ranges; the first three geared, the other direct through multiple V-belt drive.

Preselection allows the operator to choose up to four speeds in any one range through potentiometer control. These preselected speeds are brought into play as required by simply depressing a pushbutton.

Gear box and end gearing are totally enclosed. The end gear train carries a fixed center quadrant which facilitates change of gearing for chasing odd leads or the substitution of metric end gearing. A range of 66 threads and feeds are available.

Monarch Machine Tool Co, Sidney, Ohio

MORE DATA? Circle 51, inside back cover



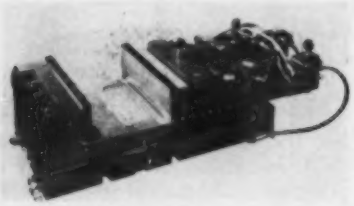
Visi-Trol Vertical Milling Machine Has 3-D Hydraulic Duplicating Controls

Model 3½ vertical milling machine, which has a 16 x 66-in. table with slots, is convertible from a duplicating to a conventional milling machine in only one minute. Vertical feed is infinitely adjustable under power or hand operation, and vertical travel is 16 in.

The micro-hydro three dimenisonal hydraulic duplicating unit, which is powered by a 5 gpm pump, has a 30 gal reservoir. The table has a micrometer adjustable tilt to 45° each side of the table, with positive locks at center, 10, and 45 degree positions.

Visi-Trol Engng Co, 12720 Burt Rd, Detroit 23, Mich

MORE DATA? Circle 52, inside back cover



Hydraulic Vise Will Not Slip Or Twist Under Machining Stress

This new hydraulic machine vise (shown with cover removed) has a high gripping pressure provided by short stroke cylinder and cam operation; therefore work will not slip or twist under machining stresses. Hydraulic fluid can be supplied directly from the hydraulic system of the machine on which it is used.

All wearing parts and work surfaces are made of hardened and ground alloy steel. The vise, although it is quickly removable from a machine, may be made a permanent fixture.

Acme Precision Products, Inc, 215 N Findlay St, Dayton, Ohio

MORE DATA? Circle 53, inside back cover

ACF Portable Riveting Machine Said to be 11 Times Faster

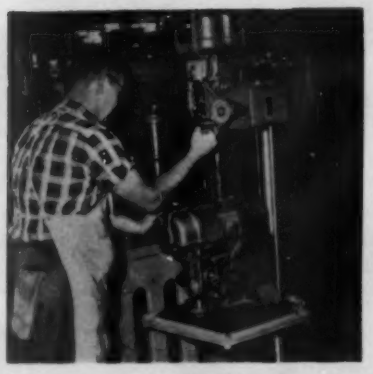
This portable riveting machine, which is claimed to represent a "first" in the machine tools industry and to operate 11 times faster than any existing method, was unveiled at the Production Engineering Show. It holds approximately 500 flush- or round-head rivets in a pneumatically driven rotating drum and performs all necessary operations automatically in less than two seconds.

The machine weighs 50 lb and rivets holes of both ⅛ in. depth and diameter. Models for other sizes of rivets also will be available, the company says.

Controlled by a finger trigger and hand grip instead of a foot-pedal, the machine automatically punches a hole in the pieces of metal to be riveted, places the rivet in the hole, and secures the rivet.

ACF Electronics Div, ACF Industries, Inc, Paramus, NJ

MORE DATA? Circle 54, inside back cover



20-in. Power Feed Drillpresses Introduced by Walker-Turner

Machine, available in bench, floor, and multiple-spindle models, and as an overhead track-mounted tool, has a connection from which automation devices such as rotary tables may be controlled and sychronized with spindle operation.

Power feed features a front-mounted pilot wheel control that is mechanically integrated with the clutch control, allowing one-hand operation. There are four feed ratios, 0.004, 0.006, 0.009, and 0.012 ipr, with each of the five spindle speeds. The same pilot wheel is used for manual feed and no adjustments are needed to change to manual application. For rapid approach, the cutting tool may be moved to the work manually before power feed is actuated.

Additional features include a full 6-in. spindle travel providing ample capacity for drilling, counterboring, and reaming of large work; heavy-duty spindle construction; easily read depth gage; quick-release cam-actuated motor mount which permits easy belt changing. List price for the single spindle floor model is $584.

Walker-Turner Div, Rockwell Mfg Co, 400 N Lexington Ave, Pittsburgh 8, Pa

MORE DATA? Circle 55, inside back cover

Farrington Electronic Control Center Monitors Production Operations

One-man production control is possible with the Productograph, a German-developed system designed to record machine operations automatically and to reduce machine down-time. The system works best in highly repetitive operations, where it is important to keep idle time at a minimum.

The Productograph system is keyed to a console receiving unit, located in a plant's production-control center, which can supervise up to 200 machines. Pulse transducers (meters, microphones, photoelectric cells, relays, and the like) connect each machine with control center.

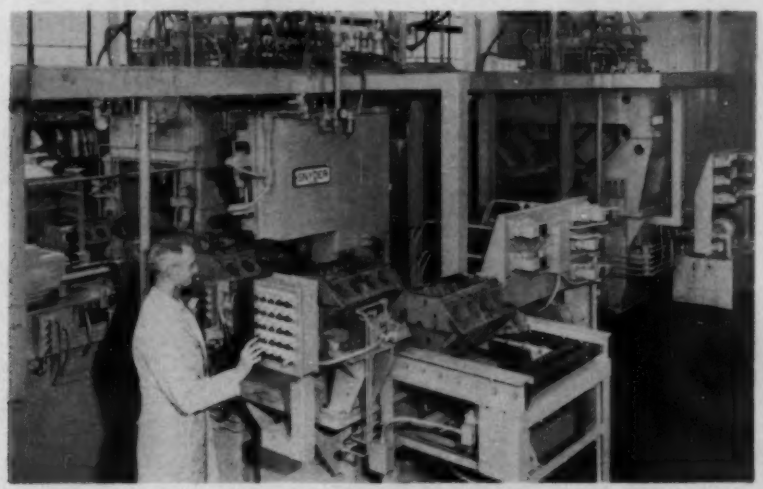
At the control center, modular units cover the following areas (see illustration):

- **Lamp fields** show the operating status of each machine. If the machine is idle, any of five causes for downtime appears.
- **Linear counters** visually display the minute-by-minute progress of the production line.
- **Decade counters** records the number of parts that each machine produces.
- **Running-time counters** record in minutes the running time of each machine.
- **A tape recorder** records conversations between each machine operator and the control center.
- **A phone system** gives two-way communication between machine operator and console operator.
- **A detail scriber** produces a production-chart tape.
- **A graphic recorder** continuously charts production time and downtime of each machine on the line.
- **Totalizers** record the total time of each category of machine running time and downtime.

The system, which has been installed in more than 200 European plants, has just been introduced in the U. S.

Farrington Instruments Corp, Needham Heights 94, Mass

MORE DATA? Circle 56, inside back cover



SPECIAL TRANSFER-TYPE MACHINE, designed to de-fin automotive V-8 engine block iron castings at 240 an hr, is first application of transfer machines with automation in foundry to remove fins. Instead of cutting tools, machine removes fins with air cylinder-actuated round hardened steel punches and hardened steel form chipping tools actuated by air hammers—*Snyder Corp, 3400 E Lafayette, Detroit, Mich*

MORE DATA? Circle 57, inside back cover

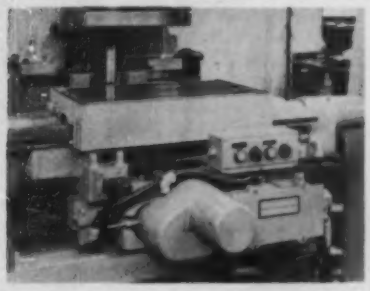
Device Joins 'Unjoinable' Materials With Silent Sound

Emitting high-pitched silent sound waves at 25,000 cps, this Ultrasonic Joining Unit can join such materials as aluminum, silicon, germanium, and ferrites, all of which were previously considered difficult or impossible to "wet" with fluxless solder or to weld. The materials are considered difficult to join because the oxide film, which forms on their surface, prevents solder without flux from wetting the surface.

The generator converts a 60-cycle current into a 0.001-in. stroke at 25,000 cps. These strokes are transmitted to the tool tip which excites the molten solder on the surface of the weld-piece; thus it breaks down the oxide film and permits solder to flow.

Commercial Apparatus and Systems Div, Raytheon Co, 1415 Providence Turnpike, Norwood, Mass

MORE DATA? Circle 58, inside back cover



Low-Cost Micro-Path Control System is Simple to Program

The MPI 801 system—a numerically-controlled point-to-point positioning system which includes the MPI 850 positioning table for the drilling or milling machine (shown)— is priced at $25,000. The system, which is accurate to one ten-thousandth, has a completely transistorized electronic console and is said to be so simple to operate that the average secretary can program it.

Without oscillating, the turret drill or other machine tool under control of the system can make movements as small as one tenth. Programs are introduced into the system by Flexowriter punched paper tape.

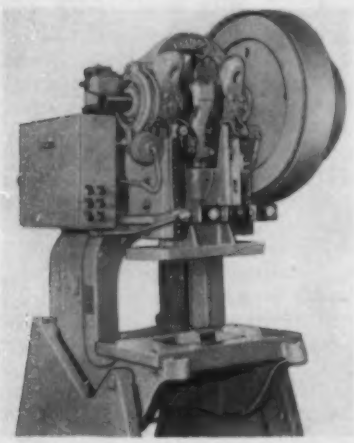
The system is expandable into a complete contour system with the addition of an interpolator, and is reported to require less preventive maintenance than any comparable system known to be in operation.

Micro-Path Inc, 10321 Anza Ave, Los Angeles 45, Calif

MORE DATA? Circle 59, inside back cover

ALUMINUM STEERING GEAR HOUSINGS are processed by this 8-way, 8-station horizontal and vertical automatic indexing machine. Machine produces 153 housings an hr and does rough and semi-finish boring, generating, drilling, countersinking, tapping, and cross-facing—*Greenlee Bros & Co, Rockford, Ill*

MORE DATA? Circle 62, inside back cover



Johnson Announces Wide Bed OBI Press With Box-Type Ram

Model 45W, which is a 45 ton press with oversize features usually available only in larger capacity presses, is offered with a choice of mechanical or Wichita Air Clutch, flywheel, or single geared drive and standard or oversize flange ram 26 x 15 in. Some specifications are: Bed, 33 x 22 in.; ram face, 22 x 15 in.; opening through uprights, 21 in.; throat depth, 12 in. It is available with a box-type ram (as shown).

Johnson Machine & Press Corp. 620 W Indiana Ave, P O Box 426, Elkhart, Ind

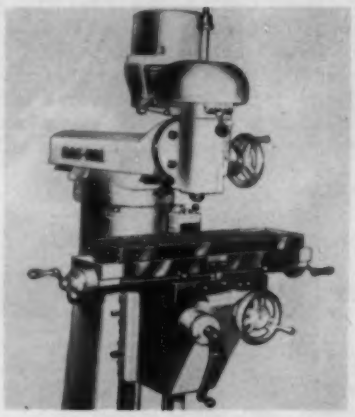
MORE DATA? Circle 60, inside back cover

Facet Tooth Files Have New Design That Increases Life

A new design feature for tungsten carbide rotary files is said to increase the efficiency and life-span of the files up to 25 times. The Facet Tooth files have a special, second trailing edge on the length of each tooth which gives each flute more strength and results in faster and smoother stock removal.

Grobet File Co of America, Inc, Carlstadt, NJ

MORE DATA? Circle 61, inside back cover



Vertical Milling Machine Has Built-In Magnetic Table

Mag-Mill's electro-magnetic table is controlled with a dc rectifier with a built-in manual reversing switch which demagnetizes the table, workpiece, and accumulated chips. Automatic demagnetizing is also available.

Table has a 7 x 27-in. working surface with three T-slots 11/16 in. wide and 2½ in. apart. Longitudinal table travel is 16 in., cross travel 8 in., vertical knee travel 15 in., vertical quill travel 4 in. Distance from spindle nose to top of table is 16 5/16 in. With compound head swivel, available as optional equipment, distance is 16 9/16 in.

Hanchett Magna-Lock Corp, Big Rapids, Mich

MORE DATA? Circle 63, inside back cover

WHITMAN & BARNES
MAKERS OF FINE TOOLS SINCE 1845
DRILLS AND REAMERS

which drill really costs less?

Based on results, drills "A" and "B" (center and right, above) should cost 43% and 39% less than W & B drills (left, above)—instead, they can be purchased at *only* about 20% less.

Watch those *initial* costs—they may be *costly!*

COMPARATIVE DRILLING PERFORMANCE

General Purpose Jobbers Drills	*No. of holes per drill size					Total No. of Holes	Efficiency Rating
	#40	#30	5/16"	1/4"	3/8"		
W & B Drills	208	62	57	50	34	411	100%
"A" Drills	142	24	14	28	28	236	57%
"B" Drills	114	49	13	61	15	252	61%
Thickness of plate	1/32"	3/16"	1/8"	1"	1"	Material: Heat treated chrome nickel steel	

**In each drill size, five drills of each brand were tested and each drill was resharpened three times as required.*

W&B

PARTNERS IN PRODUCTION PROGRESS

Many drill performance tests similar to this one have been made. However, W & B will gladly conduct drill tests at *your* plant and under *your* conditions. Contact us direct or through your W & B distributor. He can offer this service plus fast delivery from complete stocks.

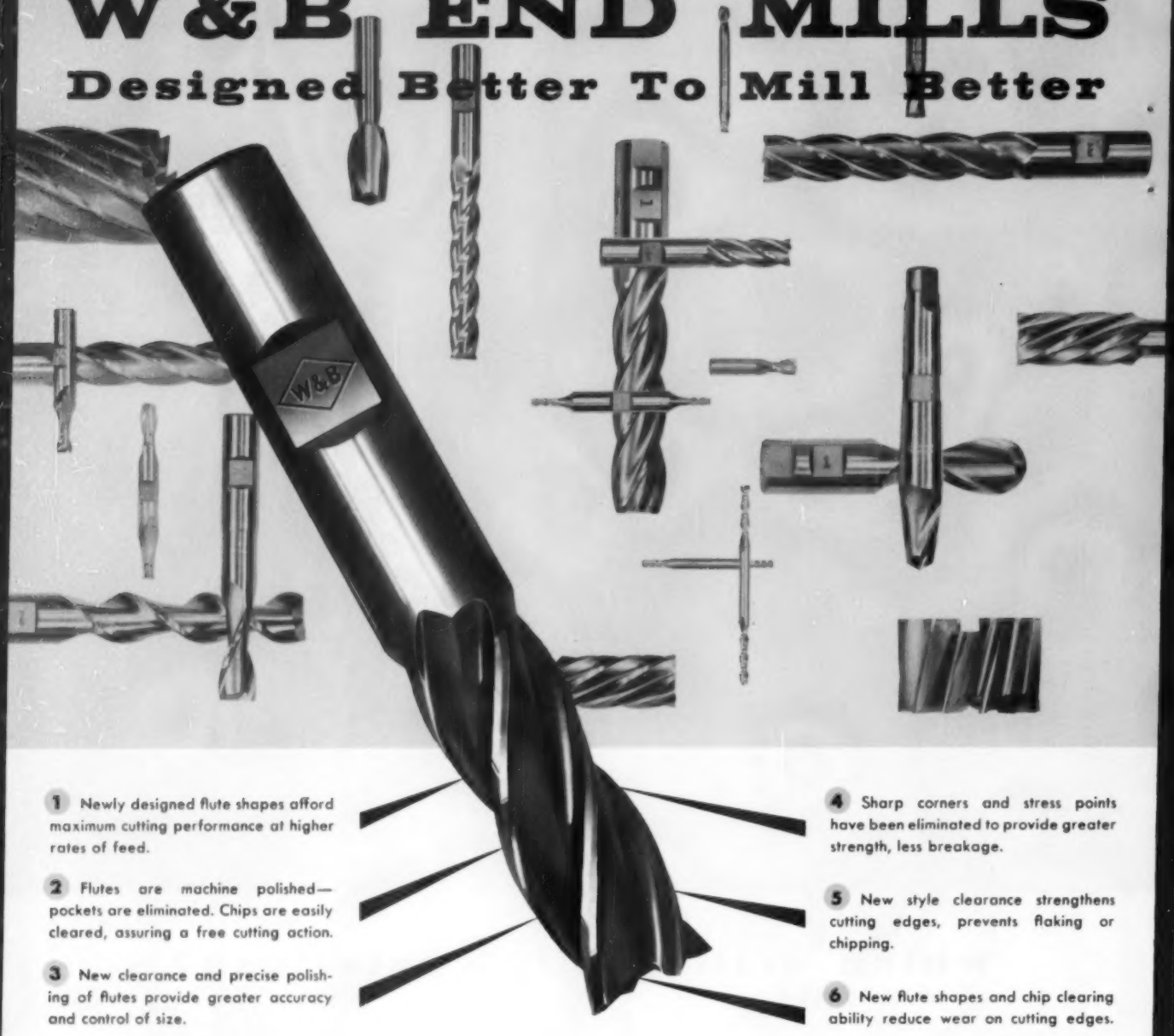
WHITMAN & BARNES

40000 PLYMOUTH ROAD • PLYMOUTH, MICHIGAN

DRILLS • REAMERS • END MILLS • COUNTERBORES • COUNTERSINKS • CARBIDE TOOLS • SPECIAL TOOLS

W&B END MILLS

Designed Better To Mill Better



1. Newly designed flute shapes afford maximum cutting performance at higher rates of feed.

2. Flutes are machine polished—pockets are eliminated. Chips are easily cleared, assuring a free cutting action.

3. New clearance and precise polishing of flutes provide greater accuracy and control of size.

4. Sharp corners and stress points have been eliminated to provide greater strength, less breakage.

5. New style clearance strengthens cutting edges, prevents flaking or chipping.

6. New flute shapes and chip clearing ability reduce wear on cutting edges.

Every Feature Says Compare!

Try W & B end mills on your milling operations . . . a comparison will demonstrate their superior performance. Your local W & B distributor carries a complete stock of standard, off-the-shelf types and sizes. He offers you the best in service and delivery on end mills for any standard application—so, to make your own performance comparison, call your industrial distributor today!

W&B

INDUSTRIAL DISTRIBUTORS

THE RIGHT HAND OF PRODUCTION

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WHITMAN & BARNES

MAKERS OF FINE TOOLS SINCE 1868

DRILLS AND REAMERS

40000 PLYMOUTH ROAD • PLYMOUTH, MICHIGAN

NEW YORK CHICAGO LOS ANGELES

DRILLS • REAMERS • END MILLS • COUNTERBORES • COUNTERSINKS • CARBIDE TOOLS • SPECIAL TOOLS

Now you can get any soluble coolant you need . . . from one source . . . Sunoco

Sun is literally a supermarket for soluble oils—all the way from a low-cost emulsifying oil to a chemical coolant. Each one can solve a different production problem. For example:

For versatility at moderate cost, use regular S.E.C.O. (Sunoco Emulsifying Cutting Oil).

For heavy-duty work, use S.E.C.O. HD.

For high detergency, machine or grind with S.E.C.O. 271.

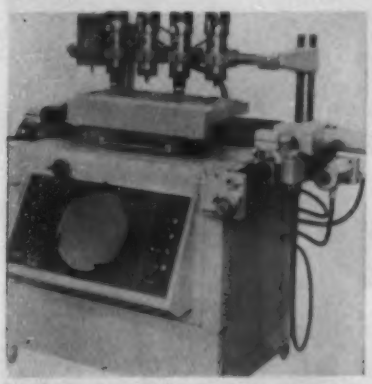
For high-power wetting and lubricity, use Sun's new chemical coolant, Sunicool.

You can profit by checking into the benefits of Sun Soluble Cutting Oils. They've led the field for years . . . they're backed by Sun Oil . . . they're good. And so are Sun's many straight and compounded oils. Ask your Sun man for all the details, or write to SUN OIL COMPANY, Dept. AM-10, Philadelphia 3, Pa. In Canada: Sun Oil Company Limited, Toronto and Montreal.

MAKERS OF FAMOUS CUSTOM-BLENDED BLUE SUNOCO GASOLINES

◀ CIRCLE 246 READER SERVICE CARD

▲ CIRCLE 247 READER SERVICE CARD



Micro-Path Markets High-Speed Circuit Board Drilling Machine

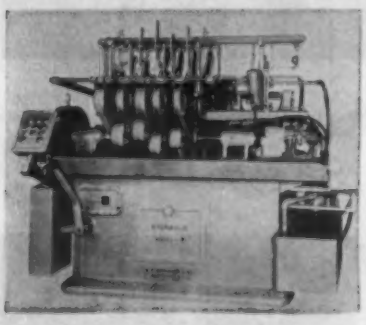
This new MPI 440 automatic circuit board drilling machine, coupled with Micro-Path magnetic tape control, is capable of drilling 40 holes per min with each drill head; therefore, with four stacks of four boards each, the machine drills 640 holes a min, with an average positioning time of less than one sec.

On a 20 x 30-in. table, the machine also has the capability of routing contours or dividing multi-circuit boards into individual boards. A contour stylus programmer is used for the routing operations.

This new equipment is priced at $27,000, with the contour stylus programmer optional at $2,000.

Micro-Path Inc, Sub of United Industrial Corp, Los Angeles, Calif

MORE DATA? Circle 64, inside back cover



Footeburt-Schraner Lappers Handle 84-in. Crankshafts

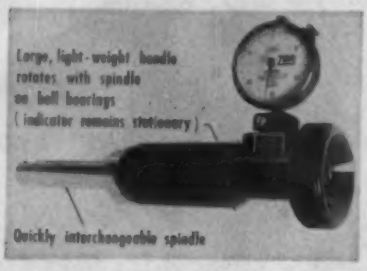
This new line of crankshaft lapping machines, which provide a 4—7 microinch finish at rates up to 60 an hr, comes in models for all sizes of crankshafts up to 84-in. long. With coated abrasive cloth, these machines lap all bearing surfaces and oil-seal surfaces on crankshafts of all kinds.

These lappers, which lap bearings surfaces and fillets in one operation, have an exclusive "no master crank" feature, and therefore do not require expensive, hard-to-change master cranks to guide the work.

No setup time or major adjustment is required when changing runs.

The Foote-Burt Co, Cleveland 8, Ohio

MORE DATA? Circle 65, inside back cover


Large, light-weight handle rotates with spindle on ball bearings (indicator remains stationary)
Quickly interchangeable spindle

HOLE LOCATION GAGE features quickly interchangeable spindle. Gage checks hole location, concentricity, and alignment, or explores holes to determine whether they are tapered, "out of round", or machined "out of square" —*Zero Internal Gage Co, 11360 Schaefer Hwy, Detroit 27, Mich*

MORE DATA? Circle 66, inside back cover

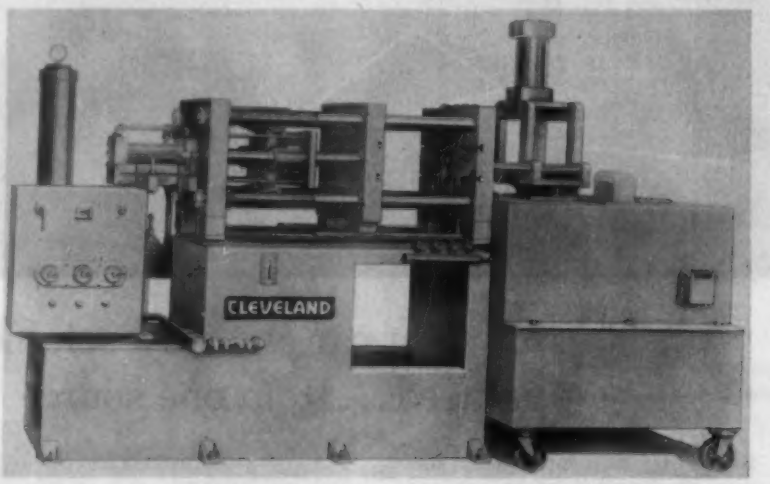
Complete Set of Optical Tools Assembled in Lightweight Kit

Optical aids kit contains more than 20 units which can be assembled into a variety of viewers, surface comparators, and microscopes.

Magnifications vary from 7X with the small optical viewer to combinations of 10X, 20X, 40X, and 80X with the various microscopes. Also included is a selection of reticles and measuring scales ranging from divisions of 0.001 in. to 0.005 in. The instruments are suitable for mounting on machinery as well as for bench inspection. Price is $750.

Bausch & Lomb Inc, Rochester 2, NY

MORE DATA? Circle 67, inside back cover



Cleveland Die Casting Machine Comes In Hot, Standard, and Cold Chamber Models

Entirely new design of Model 100 die casting machine, which has strain gage tested locking pressure of better than 100 tons, is available as a standard, or fully automated, hot chamber machine; a standard cold chamber machine; or a cold chamber machine equipped with the Morton system of vacuum die evacuation, with or without automatic aluminum ladling.

Model 100 is equipped for accumulator operation of both shot and die closing cylinders, and cycles well over 1000 shots per hr, depending upon size and complexity of casting, metal being cast, and method of operation. It has a shot capacity of 2.6 lb aluminum and 4.2 lb zinc with standard plungers. Platens are 3¾ in. thick and tie bars are 2½ in. dia.

Cleveland Automatic Machine Co, 4932 Beech St, Cincinnati 12, Ohio

MORE DATA? Circle 68, inside back cover

automation at its best!! as *only BAUSH can do it* - -

with Baush *completely mechanical* transfer machines using "S"-Type Leadscrew Units . . .

TO GIVE YOU:

Easy, economical maintenance with shop mechanics . .
Interchangeability of units . .
No expensive hydraulic oil . .
No costly hydraulic leaks . .
Positive, steady tool feed . .
No surge or tool breakage in break-thru . .
Longer life of motors, gears, spindles and guide bushings . .

WHY NOT TRY US?

BAUSH
MACHINE TOOL CO.
SPRINGFIELD 7, MASSACHUSETTS

CIRCLE 248 READER SERVICE CARD

General Electric Introduces Static Adjustable Speed Drive

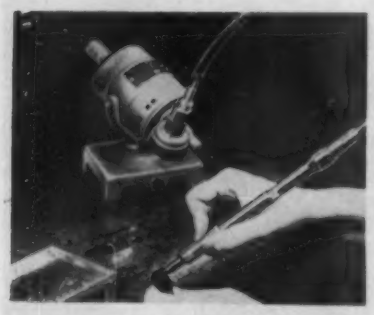
Called Statotrol, this new static adjustable speed drive promises use in many applications previously considered unsuitable for electronic drives because of cost, size, and performance limitations. The fractional horsepower device is low in cost, compact, and efficient.

The heart of the drive is its control module which combines a tiny silicon-controlled rectifier and simplified, encapsulated circuitry. This control module, along with a suitable potentiometer and disconnecting means, constitutes a complete control for starting, stopping, and adjusting the speed of a dc motor.

Available in standard ratings from 1/20—¾ hp, Statotrol drive has a standard speed range of 8 to 1; for intermittent duty, it may be operated over a much wider range. The drive, which is designed for operation on a 115 v, 50/60 cycle, single phase power supply, may be operated from any standard voltage with a suitable transformer.

General Electric, Schenectady 5, NY

MORE DATA? Circle 69, inside back cover



Miniature Screwdriver, Nut-Runner Uses Flexible Shaft Power Supply

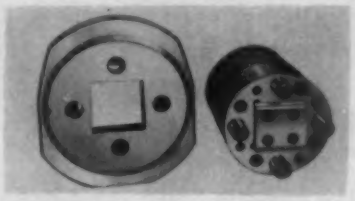
This flexible shaft-type power screwdriver, which doubles as a nut-runner, is completely miniaturized and has a handpiece which weighs but 5½ oz. First of its size, it will drive all kinds of screws and nuts from No. 0—4 and larger in certain cases.

The electrically driven tool, which is available in bench and hang-up models, is designed for regular production work on small assemblies, but is also capable of many special and delicate jobs which may be inaccessible or awkward for other types of power tools.

Provision is made for quick changeover of bits; no tools, wrenches, or keys are required to remove or replace them because they are held firmly and accurately in position by a special snap-lock.

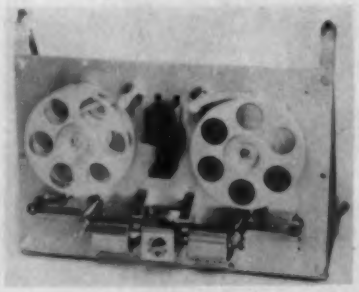
Foredom Electric Co, Inc, Bethel, Conn

MORE DATA? Circle 70, inside back cover



SHEAR-PROOF PUNCH, used with standard or rotary head punchpresses, permits punching, notching, and trimming steel and all light and medium gage materials up to 0.125-in. thickness without shearing. Units are available in ¾, 1, and 1½-in. sizes—*Anetsberger Bros Inc, 120 N Anets Drive, Northbrook. Ill*

MORE DATA? Circle 71, inside back cover



Punched Tape Reader Reads Over 200 Characters a Sec

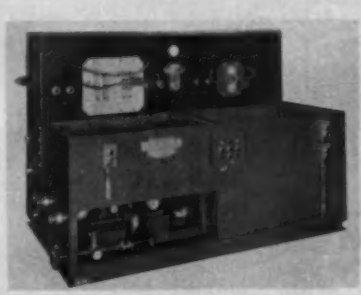
This high-speed punched tape reader —which is capable of stopping on character at a normal tape reading rate of more than 200 eight-bit characters per second—will read punched one-inch Mylar or paper tape. Its tape capacity is 550 feet.

The normal reading rate of the reader is 20 ips in both forward and reverse directions; however, with its fast reading rate, it can read up to about 1400 characters per sec in either direction.

An optical scanning system reads the characters without stopping the tape. Photo-sensitive silicon diodes and completely transistorized circuits provide dc response characteristics in the data channels.

Westrex Recording Equipment Dept, 6601 Romaine St, Hollywood 38, Calif

MORE DATA? Circle 72, inside back cover



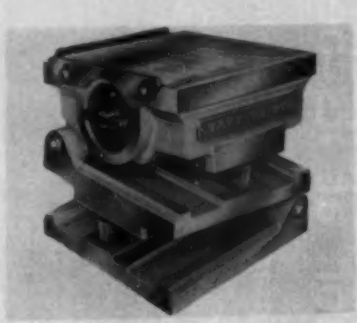
Three-Position Work Station Permits High or Low Frequency

The flick of a selector switch, which in turn selects the desired operating frequency, makes it possible to perform hardening applications at high or low frequencies in this new Ther-Monic machine. The machine, which is equipped with a two-position low frequency of 450 KC, has a single-position higher frequency output of from 2—7 MC.

It has dual facilities for oil and water quench mediums used in hardening applications, and can also be used as a reservoir for both oil or water recirculating systems, or for drop quench systems.

Induction Heating Corp, 181 Wythe Ave, Brooklyn 11, N Y

MORE DATA? Circle 73, inside back cover



Sine Angle Magnetic Chucks Added to Taft-Peirce Line

Two sine angle models added to Superpower line provide means for setting light machining or inspection jobs to either simple or compound angles. Model 8866-1 is for simple angles, Model 8866-2 for compound.

Control knob on either side will

this 3 in 1 machine tool

combines

jig boring

+

vertical milling

+

infeed milling

...costs less than a jig borer alone

Add all the plusses together on this new Hurth V-11 Vertical Boring & Milling Machine and you'll come up with the same answer so many toolrooms agree on: "It's a lot of precision machine for the money!"

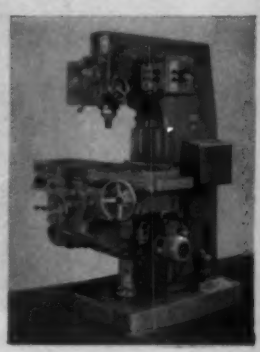
It is *that* all right! A 3-way producer that does—

1. **Jig Boring**—Using continuous spindle down-feed in finely graduated steps.
2. **Vertical Milling**—Using longitudinal traverse of worktable.
3. **Infeed Milling**—Using longitudinal traverse of milling head plus intermittent depth feed of cutter spindle.

ACCURATE? Precision boring by the coordinate hole location method is guaranteed accurate within .0002" after fine boring. With specially designed optical system, adjustments as small as .0001" can be quickly and easily read. 13 spindle speeds (45 to 2800 rpm) permit selecting the speed that's just right for the cutter diameter and material involved.

RIGID AND RUGGED? Worktable has been increased to 48" x 14"; column is wider and throat is 50% deeper than previous model to handle bulky work. Base is more massive—enlarged from 22" to 34". So is the motor—3 h.p. And the machine's 6120 lbs. over-all weight assures vibration-free operation during heavy boring or milling.

There's so much more you'll want to know about this remarkable new Hurth machine than space here permits telling. Our catalog covers all the features in detail and an Orban technical representative will fill in the rest. Why not ask him to stop by?



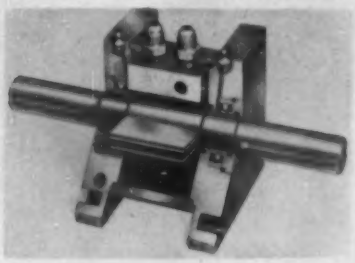
KO KURT ORBAN COMPANY, INC.

36 Exchange Place, Jersey City 2, N. J.

quickly energize the magnetic surface for positioning of the work or for maximum grip. Plates can be locked at any angle by screws. Angle settings are obtained by use of gage blocks and a precision ground step on the baseplate makes it possible to set angles down to zero. Back and end stops, both adjustable, are provided on both models. Tool steel sine rolls, hardened and lapped, are positioned on 5-in centers within ± 0.00015 in. They are alike, round and straight within a tolerance of 0.00005 in., and parallel with each other and the work surface within 0.00010 in. Work surface is flat, square with the sides and parallel to the base within 0.0002 in.

Taft-Peirce Mfg Co, Woonsocket, RI

MORE DATA? Circle 74, inside back cover



Line of Oscillating Motors Have Instant Full Torque

A complete line of compact pneumatic and hydraulic oscillating motors, with instant full torque, are manufactured under exacting tool room methods and strict quality control. Available in single vane or double vane types, the standard units will produce torques from 100—430,000 in.-lb; the heavy duty line is built for 2000 psi operation with a wide safety factor.

Roto-Tork Mfg Co, 23919 Little Mach, St Clair Shores, Mich

MORE DATA? Circle 75, inside back cover

SPOT WELDING GUN 407 has capacity of 14,000 amp. It welds from lightest gage up to 2 times ⅛ in. Air-operated and water-cooled, it has fully automatic single and repeat action. Unit is furnished with 10-in. throat; extension arms are available up to 30 in.—*Aro Spot Welder Div, Guthery Machine Tool Corp, 38-31 Crescent St, Long Island City 1, NY*

MORE DATA? Circle 76, inside back cover

Michigan Adds Two New Models To Shear-Speed Gear Shaper Line

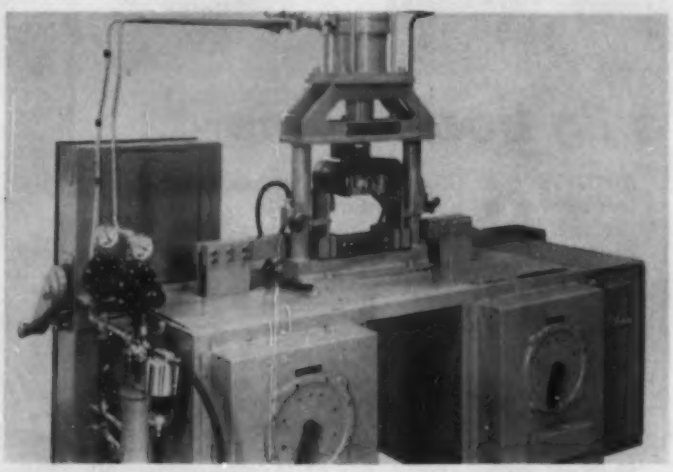
Two new Series 3000 twin-column shear-speed gear shapers have been introduced as companion machines to the 30136 and the 30206. These are the Model 3053 for gears from 3—5 in. and the 3073 for gears from 5—7 in.

The principle of operation is the same as for the earlier 1800 Series. Multiple single-point tools feed toward the center while the work reciprocates up and down to produce all teeth or forms on the contour of the work simultaneously.

The advantage of the 3000 Series, according to the manufacturer, is that a twin-column construction with integral cross-head at the top permits chip removal through the rear of machine.

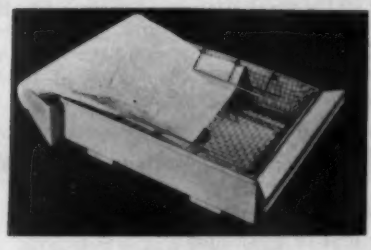
Michigan Tool Co, 7171 E McNichols Rd, Detroit 12, Mich

MORE DATA? Circle 78, inside back cover



MODEL 2400 PROJECTION WELDER capsules semi-conductor and transistor components by resistance welding over range of diameters from 0.3—1.25 in. on one piece of equipment. This is done by using twin 75 KVA transformers coupled to welding head through balanced secondary circuits and new welding head design—*Thomson Electric Welder Co, 161 Pleasant St, Lynn, Mass*

MORE DATA? Circle 77, inside back cover

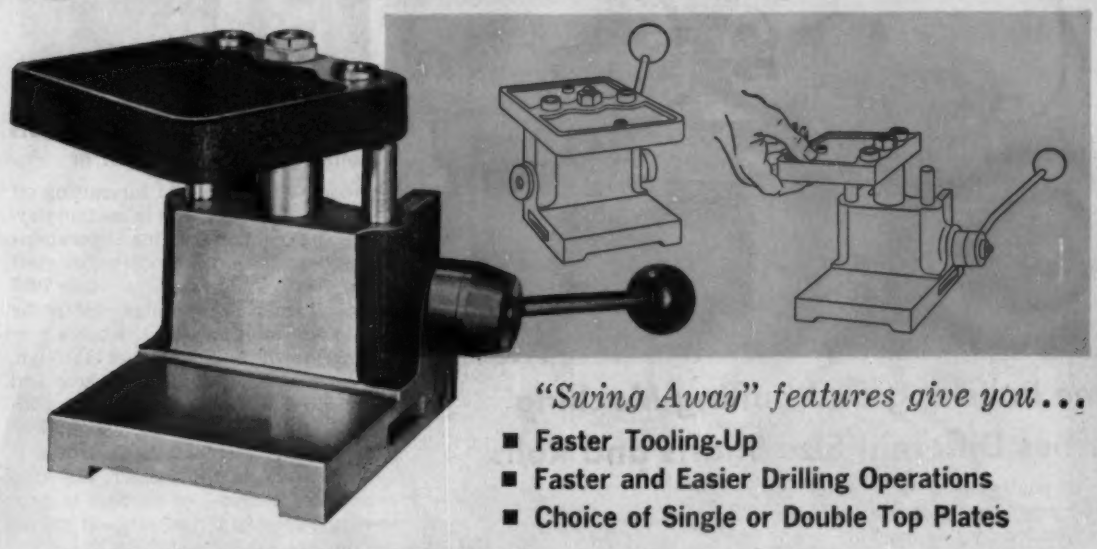


GRAVITY-FED COOLANT FILTER, which sells for less than $100, comes in three sizes for flow rates up to 16 gpm. Filtration, with a choice of several different filtering materials, is obtainable down to 10 microns—*Industrial Filter Co, P O Box 160, Montclair, NJ*

MORE DATA? Circle 79, inside back cover

tool quickly for long or short runs!

ABC LIFT SWING DRILLING FIXTURES

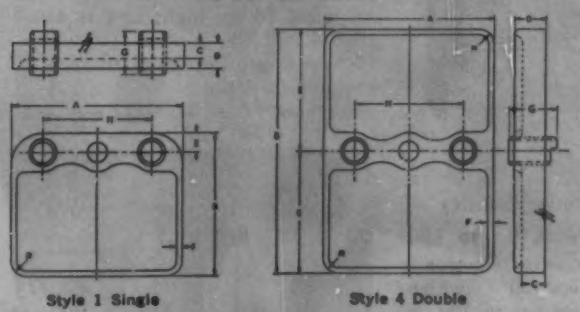


"Swing Away" features give you . . .

- **Faster Tooling-Up**
- **Faster and Easier Drilling Operations**
- **Choice of Single or Double Top Plates**

INTERCHANGEABLE TOP PLATE ENGINEERING DATA

Top Plate Dimensions



Style 1 Single — Style 4 Double

Top Plate Sizes

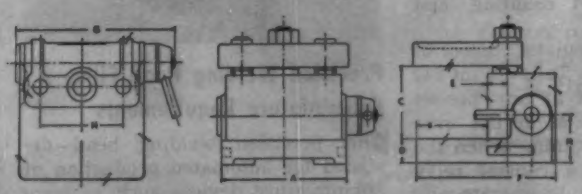
Top Plate Style	Top Plate Number	A	B	C	D	E	F	G	H	R
1	2201	2⅛	2⅛	½	½	7/16	—	⅜	1½	9/16
4	2204	2⅛	3⅛	½	½	1 1/16	—	⅜	1½	9/16
1	3201	3⅛	3 7/16	½	½	⅜	—	1	2½	⅝
4	3204	3⅛	5⅛	½	½	2 13/16	—	1	2½	⅝
1	4201	4⅛	3⅛	½	¾	⅜	9/16	1	2½	½
4	4204	4⅛	6¼	½	¾	3⅛	9/16	1	2½	½
1	5301	5½	5	⅝	1	⅜	9/16	1⅜	3½	⅝
4	5304	5½	8⅛	⅝	1	4⅛	9/16	1⅜	3½	⅝

Larger sizes and other style single top plates available.

IMPORTANT: When ordering Complete Assembled Lift Swings, specify first 3 digits of Base Number and 1 or 4 to indicate the style of Top Plate desired. EXAMPLE: LS-3221 = 3220 Base with 3201 (Style 1) Top Plate.

FIXTURE BASE ENGINEERING DATA

Fixture Base Dimensions



Top View (Top Plate Removed) — Front View — Side View

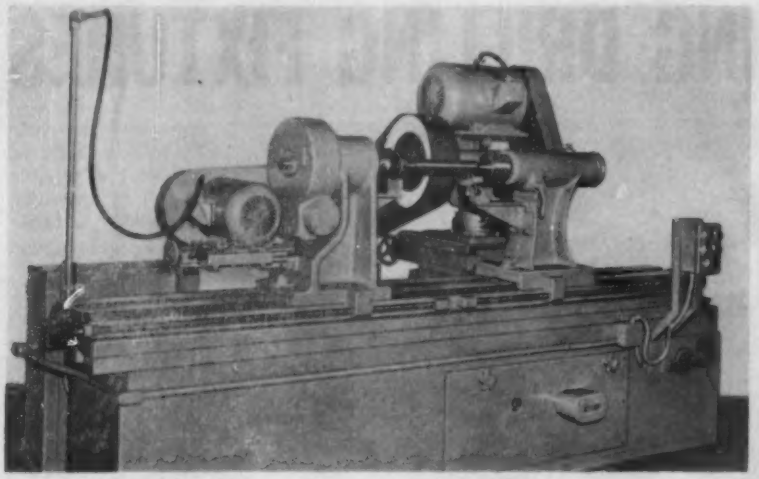
Fixture Base Sizes

Lift Swing Base Number	A	B	C	C Shut suggested max. clamp	C Open	D	E	F	G	H	R
2220	2⅛	1⅛	1½	1⅜	2¼	1	½	3⅛	3¼	1½	1 9/16
3220	3⅛	2⅛	2	2⅜	3	1	⅝	4½	5	2½	1 1/16
4220	4⅛	2⅛	2½	2⅜	3½	1	⅝	5	5⅛	2½	1⅛
5330	5⅛	3⅛	3	3⅜	4⅛	1	1	6¼	6⅛	3½	2
5340	5⅛	3⅛	4	4⅜	5⅛	1	1	6¼	6⅛	3½	2
5350	5⅛	3⅛	5	5⅜	6⅛	1	1	6¼	6⅛	3½	2

Larger sizes available. For tooling suggestions and complete engineering data write for Catalog LS-60-1.

ACCURATE BUSHING COMPANY

440 North Avenue, Garwood, N. J.



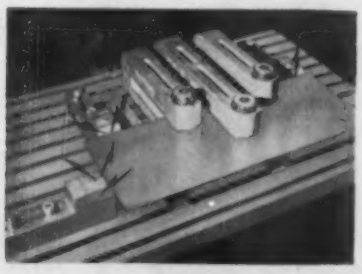
Acme Polishing and Buffing Machine Finishes Different Size Shafts and Rolls

Rolls and shafts up to 32-in. diameter and up to 72 in. long can be polished or buffed by this machine to a 2 microinch finish. The lathe-type machine, which is an integral unit, has a standard motorized buffing lathe with belt arm attachment connected directly to the base of the machine.

Abrasive belts or buffing wheels can be applied to permit either polishing or buffing operations or a combination of both to perform the desired type of finishing operation. A head and tail stock assembly with variable speed spindle drive is mounted on a heavy duty type reciprocating work table, whose speed is also variable.

Acme Mfg Co, 1400 E Nine Mile Rd, Detroit 20, Mich

MORE DATA? Circle 80, inside back cover



UNIPUNCH MAGNETIC work stops insure accurate gaging of all work pieces by eliminating "bounce back" as work piece hits gages. Permanent magnetized blocks are an integral part of these complete stops—*Punch Products Corp, 370 Babcock St, Buffalo 6, NY*

MORE DATA? Circle 81, inside back cover

Inexpensive Electronic Counter Batches in Quantities up to 100

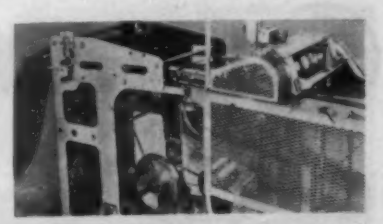
Tally-Count 242, a fully electronic predetermining counter which batches in quantities up to 100, is now available at a cost comparable to electromechanical counters of similar capacity. Its industrial applications include: batch counting, linear measurement and cutoff, container filling, sheet counting, and machine cycling.

Designed for automatic control of industrial processes, Tally-Count 242 actuates equipment at any pre-set count from 2—100 at speeds over 1000 operations per min. When the count is reached, a control relay closes momentarily to operate any external device, the counter instantaneously resets to zero, and it continues the counting process with no loss of count.

This counter is priced at $148. Tally Count 241, which counts in batches up to 10, is similar to the 242 and sells for $110.

Standard Instrument Corp, 657 Broadway, New York 12, NY

MORE DATA? Circle 82, inside back cover



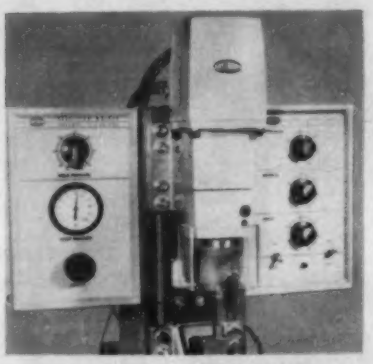
Portable Flying Cutoff Shear Cuts Coiled Strip at 7000 ft per hr

Model C-571 designed for cutting off metal strip while it is in motion during automatic forming operations handles 15-in.-wide, 20-gage steel (or 16-gage aluminum) at up to 7000 fph. Strip passes through the shear into a forming machine. When a predetermined length passes through, a limit switch actuates the shear and cut is made. Shear is equipped with feed rollers operating at slower speed than the forming machine; it feeds stock to the former, allowing time for removal of product or providing spacing for subsequent operation.

Power is provided by a 1-hp 3-phase 220/440-v motor. Unit is 32 in. wide, 56 in. high; cost is $3050 fob.

Crest Engrg Co, 529 S 7th St, Minneapolis 15, Minn

MORE DATA? Circle 83, inside back cover



Precision Welding Head Fills Subminiature Requirements

This precision welding head—designed for automated production of subminiature devices such as transistors, diodes, and other minute electronic components—can be installed in a standard "dry box." The automated "M" head has precise welding control provided by an electronic timer which can be remotely located. Welding action is initiated by automatic programming or adapted to dial feed for high production rates.

Mechanically similar to the "M"

V-R CREATING THE METALS THAT SHAPE THE FUTURE

New cutting tool materials... through metallurgical research

Years of research, experimentation and comprehensive testing have been devoted to every type of product being manufactured at V-R. By working closely with all types of industry, this metallurgical knowledge is effectively applied to meet industry's ever-changing demands for new cutting tool materials.
Above is a V-R metallurgist checking specific gravity of a metal sample on an ultrasensitive scale. Research, such as this, provides the basis for developing new cutting tool materials; for example, VR-65, a new titanium cemented carbide grade, for ultra high speed machining on *all* types of steel.

For a complete catalog of V-R quality products write:

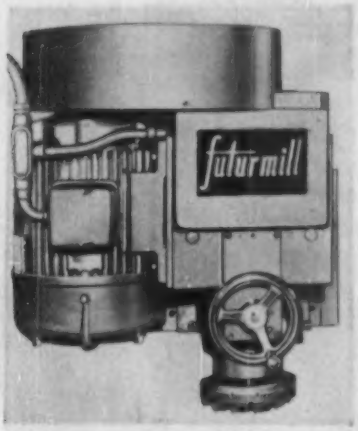
V-R VASCOLOY-RAMET
840 MARKET STREET • WAUKEGAN, ILLINOIS

C-790

head announced earlier this year, this newly designed unit can be adjusted while in a "dry box."

Commercial Apparatus and Systems Div, Raytheon Co, 1415 Providence Turnpike, Norwood, Mass

MORE DATA? Circle 84, inside back cover



ADJUSTABLE SPEED MILLING SPINDLE converts planers and older machines to competitive, rapid metal removal machinery. Model AS has adjustable speed range from 125—1100 rpm; spindle range is 10—25 hp—*Futurmill, Inc, Pontiac, Mich*

MORE DATA? Circle 85, inside back cover

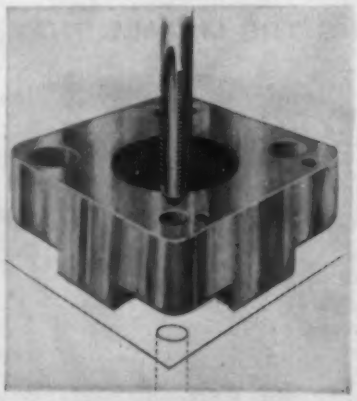
Swiss Flame Cutter Is Versatile Machine

The Gloor Expeditor, Swiss-made machine, is designed for design, development, and prototype work, limited production runs, and making duplicate parts for field repair and maintenance work.

Controls permit an operator to duplicate directly from a sketch or drawing by manually controlled tracing pencil. Machine incorporates automatic magnetic control for precise templet work and right angle, straight line, or circular cuts.

Dist by Earth Equipment Corp, 1409 Santa Fe Ave, Los Angeles 21, Calif

MORE DATA? Circle 86, inside back cover



Tap Guide is Designed With Built-In Permanent Magnet

Little Mag's magnet holds the guide firmly in position; tap is aligned with hole automatically and accurately. In addition to assuring better tapping, the tool reduces broken taps.

Unit handles standard tap sizes ¼, 5/16, 3/8, 7/16, 1/2 in. and No. 8 and No. 10. Special sizes are available on request. The recessed base permits lubrication of tap and removal of chips while tapping. The 2¾ x 2¾ x 1 3/16-in. tool is cast from Meehanite metal, cadmium plated, weighs 1½ lb, sells for $12.50.

Cling-Surface Co, 1032-1048 Niagara St, Buffalo 13, NY

MORE DATA? Circle 87, inside back cover

General Electric Redesigns Resistance Welding Regulator

This redesigned current regulator for resistance welding control assures better weld quality by compensating for all three factors that might change the welding current: line voltage fluctuations, varying load impedance, or reactance changes caused by entrance of a work piece in the welder throat.

It employs an instrument-type current transformer to sense current in the primary of the welding transfomer. Electronic circuitry advances or retards the firing of the ignitron contactors to keep the root-mean-square of each welding current pulse within ±3% of its present value. Speed of correction is 2 or 3 cycles.

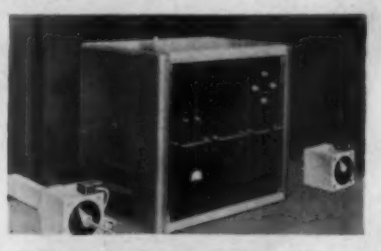
The device is available as a plug-in unit, with or without an enclosure, for any welding equipment that has phase-shift heat control. A full-phase alarm is available as an accessory.

General Electric, Schenectady, 5, N Y

MORE DATA? Circle 88, inside back cover

PORTABLE NIBBLER Model MNC permits corrugated sheets of metal to be accurately measured, cut, and fitted at its installation. It cuts even tough pitch or asbestos coated corrugated steel without clogging; also cuts small diameter duct or formed sheet metal pipe—*Fenway Machine Co, 3107 N Broad St, Philadelphia 32, Pa*

MORE DATA? Circle 89, inside back cover



Bi-Directional Step Motors Give Output as Function of Pulse

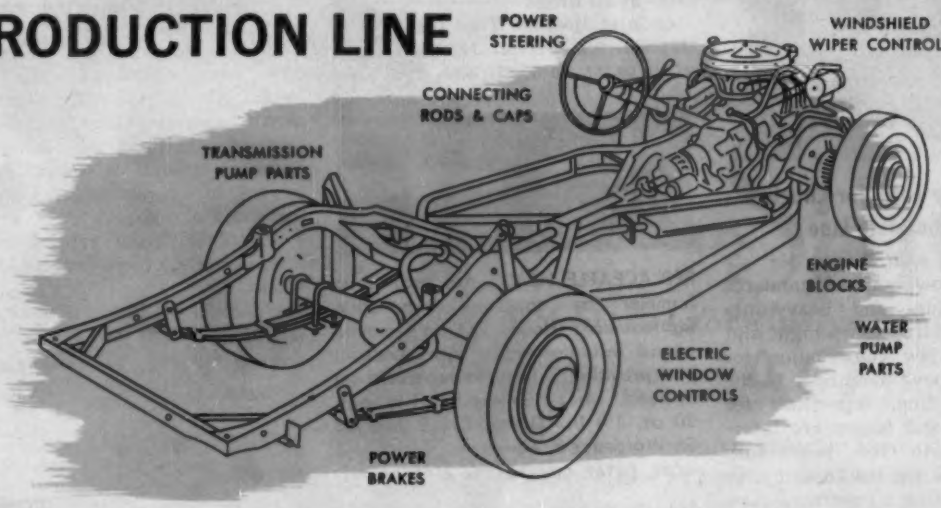
These high-speed syncro-pulse step motors provide mechanical motion, positioning actuation, or digital-to-analog conversion as an exact function of pulse signals, all without feedback circuitry, clutches, or brakes. Two hundred stops per revolution provide high resolution and linear accuracy.

The standard motor is available with either rotary output shaft or with non-rotating coaxial lead screw. A calibrated face plate dial and pointer indicates the stopped position of the armature.

Farnham Mfg Co, Div of Weisner-Rapp Co, Inc, 4050 Buffalo River, Buffalo, NY

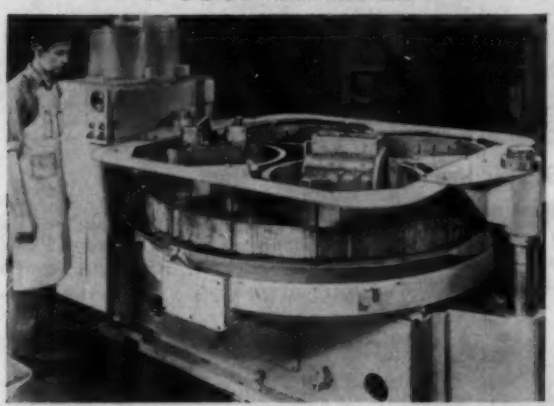
MORE DATA? Circle 90, inside back cover

HOW PRODUCTION LAPPING WITH THE LAPMASTER FITS INTO THE AUTOMOTIVE PRODUCTION LINE



There are many money-saving reasons why machine lapping with the Lapmaster has become an important, and in many cases a necessary, operation in the production of automobile parts, from large engine blocks to small water pump impellers. For instance:

A GOOD EXAMPLE



Production lapping of two surfaces on 4-cylinder engine blocks on a Model 72 Lapmaster, provides a gasketless oil seal at the oil pan juncture and a gasketless compression seal between head and block.

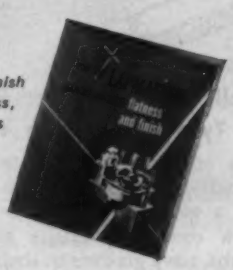
There is no other production way of finishing parts to a flatness of .0000116" or less with a micro-inch finish of 2 to 3 RMS with absolute uniformity, piece-after-piece.

Normal warpage in aluminum alloy castings easily removed to provide flat surfaces for the accuracy required in subsequent operations. Warpage resulting from clamping or chucking during previous milling and grind operations is also economically removed with the Lapmaster.

Substantial production savings are also possible because lapping eliminates need for deburring, finish grinding or milling operations and permits use of increased milling speeds.

In small lots or thousands per day, production is not interrupted or slowed down for replacing or reconditioning lap plates because Lapmaster conditioning rings automatically keep lap plate flat.

New Catalog Tells More



If flatness, parallelity or a precision finish is a problem in your production process, find out how Lapmaster is saving others money. This 24 page catalog includes technical data, specifications, tooling set-ups and actual production case histories. Send for a copy.

Lapmaster®
...THE MACHINE THAT PUT PRECISION LAPPING ON A PRODUCTION BASIS

A product of

Crane Packing Company

6436 OAKTON ST. • MORTON GROVE, ILL. (Chicago Suburb)

In Canada: Crane Packing Company, Ltd., Hamilton, Ont.

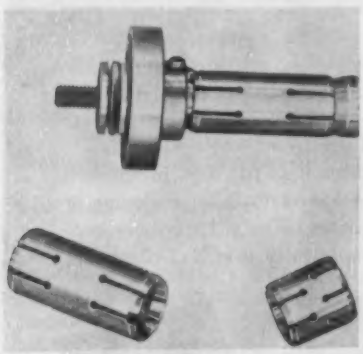
Soft Blank Top Jaws for Chucks Available in Complete Line

Line in sizes and shapes for all chucks made to American Standards includes medium and heavy-duty types in standard, extra-high and long pointed jaw construction for tongue and groove mounting. In the medium-duty line, top jaws for chucks 18 in. and larger are interchangeable with the heavy-duty type. Soft blank top jaws and master keys for mounting on serrated master jaws for heavy-duty power and scroll chucks are also available.

The top jaws can be used as supplied or shaped to meet specific requirements. They are manufactured from low carbon steel which can be easily carburized and hardened. All are furnished in black and are processed to resist rust. Hardening instructions are included.

Skinner Chuck Co, New Britain, Conn

MORE DATA? Circle 91, inside back cover



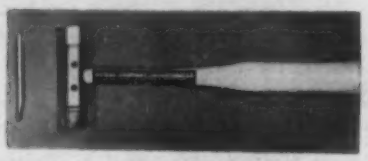
LaSalle Expanding Arbors Position Any Type of Part With Vise-Grip

Made of a special steel, these new expanding arbors position accurately with a vise-like grip. These arbors, which come in various sizes and lengths, have grooves in their sleeves which are either in-line or staggered, depending on length and size of the arbor. This gives maximum gripping power and assures a precision fit.

The split ends expand independently of each other, up to 0.006 in. Because the center section of the arbor is solid, it provides positive support and maintains perfect alignment at all times.

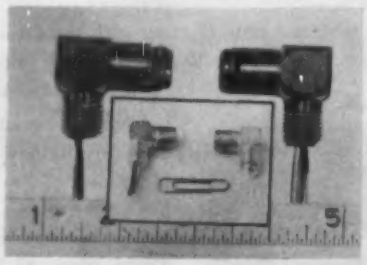
LaSalle Machine Tool Inc, 3840 E Outer Drive, Detroit 34, Mich

MORE DATA? Circle 92, inside back cover



REPLACEABLE HEADS are secured to hammer by tapping; hammering tightens hold. Heads can be removed almost instantaneously with knockout pin (provided) which fits tapered hole in head. 14-oz hammer has 1-in. dia; 20 oz, 1¼ in.—*Dumas Co, 1 Jackson St, Worcester 8, Mass*

MORE DATA? Circle 93, inside back cover



Miniaturized Electric Eyes Have ¼-in. Standard Mounting Thread

Designed especially for the automation industries, these miniaturized electric eyes are small enough to fit into the palm of the hand. Therefore, they may be mounted in hitherto restricted areas. In addition, they are low enough in cost to be used in monitoring, counting, and positioning applications.

The pickup units, which are provided with a ¼-in. standard pipe thread for easy mounting, may be used to operate relays from a direct or a reflected light. By a proper adjustment of controls, the relays may be set to operate at any desired threshold of light.

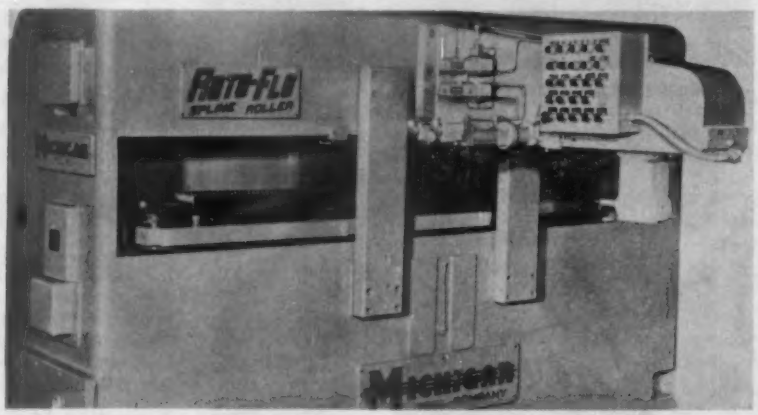
Several different type photocells are available for use to meet various conditions.

Photomation, Inc, 96 S Washington Ave, Bergenfield, NJ

MORE DATA? Circle 94, inside back cover

RADIAL ARM POWER TOOL, the 925-E, which sells for under $200, has 1.8 hp at the spindle and makes a 2½-in. deep cut—*DeWalt, Inc, Lancaster, Pa*

MORE DATA? Circle 95, inside back cover



THREE IMPROVED MODELS of Roto-Flo machines—for cold-forming splines, serrations, and similar forms—more easily accommodate shorter runs of a variety of parts in addition to long runs on a single part. New adjustable head and tailstocks can easily be reset for work of different lengths—*Michigan Tool Co, 7171 E McNichols Rd, Detroit 12, Mich*

MORE DATA? Circle 96, inside back cover

Save Eyes . . . Save Money!

(and worker skills)

Up to $100,000 and more yearly for Larger Companies.
(Case histories show these savings are possible)

Meet "DURA Safe"

New Milestone in Eye Protection by AO

Ask your safety director about Durasafe — new and great line of American Optical safety glasses! By protecting your workers with this equipment — engineered for safety with unexcelled fitting qualities — glasses that are comfortable, willingly worn, *eyes will be saved and dollars, too — in four, five and even six figures.* Remember the *indirect* costs of eye accidents are about 4 times the direct costs. Give your workers the best — Durasafe!

AO DURASAFE with black on crystal (F9800BC)

A few of the important high quality features

- New 7 Barrel Hinge — 40% increase in strength at the most vulnerable spot — where frame and temple are joined
- Duragrip Screw Construction — Keeps frame temples tight **permanently,** screws can't fall out
- Wider frame temples — Stronger (minimizes breakage), better appearance, more comfort, conform better to head contour
- "Lock-A-Lens" — New safety ridge locks lens in frame — locks trouble out
- "Breeze Catcher" — New safety and comfort in non-reflecting mesh side shields
- Sturdier frame — more massive for extra strength
- Available in six basic models: Smoke, Mahogany and Pink Crystal plastic frames and 2-tone combinations

Aways insist on AO Trademarked Lenses and Frames

American Optical COMPANY

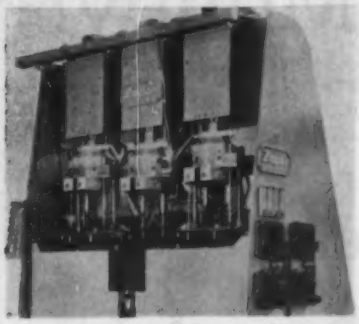
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS

Safety Service Centers in Principal Cities

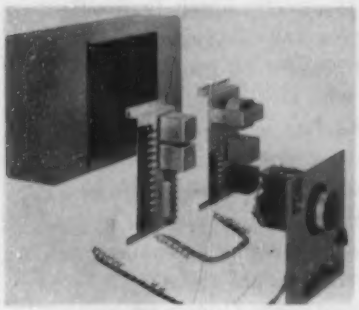
AO DURASAFE with aluminum spatula temples and "Smoke" Frame. Cat. No. F9800S.

Your Surest Protection...AO SURE-GUARD Products



DRILLING AND TAPPING in limited production quantities is done by this machine on a great variety of 2-spindle hole patterns. Up to 25 different shafts with different hole spacings or patterns can be accommodated—*Zagar, Inc, 23886 Lakeland Blvd, Cleveland 23, Ohio*

MORE DATA? Circle 97, inside back cover



Line of Adjustable Speed Drives Features Modular Design

Relay panels, rectifier panels, and control panels are designed as individual units and mounted separately in a compact enclosure in Cleveland Series 35 electrical drives. Modular construction permits prewiring and pre-stocking of a wide variety of chassis to meet different specifications.

These dc motor drives use adjustable autotransformers in combination with full wave rectifiers to attain infinitely variable speed adjustments over a wide range. They are available in Size 1 for 1/3 hp max and Size 2 for ¾ hp max. Two other sizes are offered with maximum ratings up to 10 hp.

Cleveland Machine Controls, Inc, 1155 Brookpark Rd, Cleveland 9, Ohio

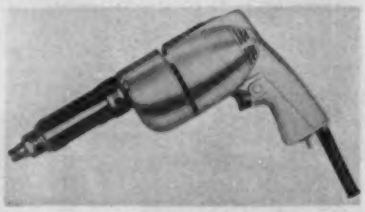
MORE DATA? Circle 98, inside back cover

Air Gage Measures Both Inner and Outer Races

Little Champ Dialaire 3-point inner and outer race diameter gage is 6 in. wide x 7 in. deep. Quick change tooling is used to handle bearing sizes 8mm to 50mm bore range. This is identical with existing Precisionaire Bearing Matching Gage tooling which can be used interchangeably on the gage. The instrument offers ample air gage amplification for close tolerance grinding. Each division on the Dialaire equals a tenth. Gage is designed especially for use in the production of a wide variety of races and lot sizes.

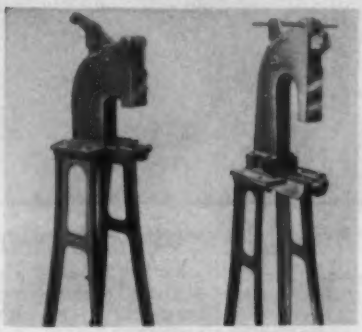
Sheffield Corp, Dayton 1, Ohio

MORE DATA? Circle 99, inside back cover



ELECTRIC DRIVERS with anti-ratcheting clutch are available in two models. Both the assembly model 235 and reversing model 272, which may also be used for disassembly work, have capacities of ¼-in.-dia machine screws and nuts, No. 12 self tapping screws, and No. 12 wood screws—*Skil Corp, 5033 Elston Ave, Chicago 30, Ill*

MORE DATA? Circle 100, inside back cover



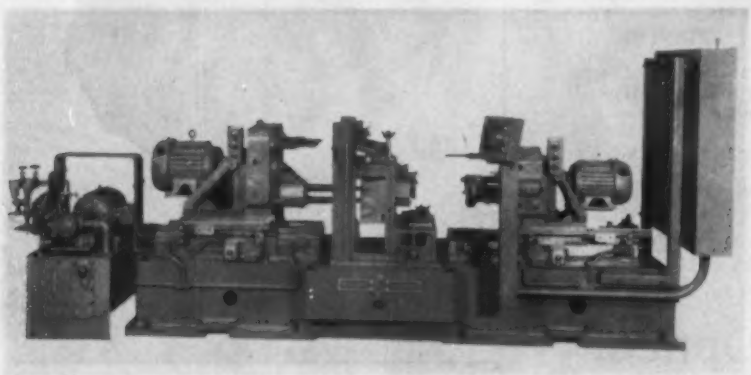
Foot Presses Introduced With High Stroke and Throat Capacities

Foot press is designed to be used when cutting, forming, and sustained pressure are required in the same operation. Heat sealing may be done at the same time. Pressure can be sustained at any point within the stroke and held there as long as desired.

Two models are available. No. 101 has a throat depth of 6¼ in. and a stroke length of 3¼ in. No. 202, designed for cutting and forming heavier materials, has throat depth of 3½ in. and stroke length of 1½ in.

Sheroff-Green Co, 85 Bleecker St, New York, NY

MORE DATA? Circle 101, inside back cover



MACHINE SERIAL 1311, horizontal two-way single station drilling machine with two-position fixture for drilling automotive intake manifolds, produces approximately 60 parts an hr. Two R-J 10-in. hydraulic way type units—one with a 10-spindle head and the other with a 5-spindle head—are mounted opposed —*Rehnberg-Jacobson Mfg Co, Rockford, Ill*

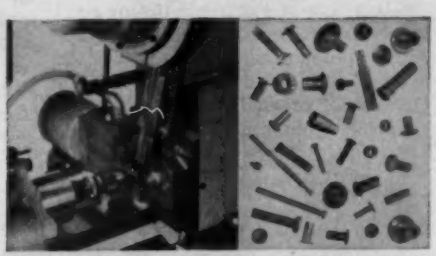
MORE DATA? Circle 102, inside back cover

NOW AVAILABLE...

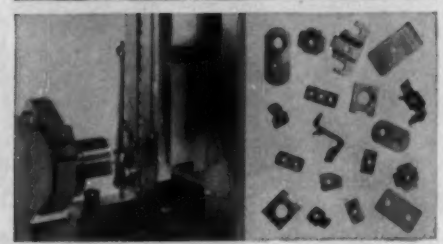
for automatic drilling, tapping or threading

Hand feed or hopper feed with or without air-operated clamp

NOW...drill rivets faster with minimum tooling costs



Drills 500-3600 per hour; hopper feed; air-operated clamping. Capacity #74 (.0225") to ⅛" in mild steel.



Taps 4000 per hour hand feed magazine. Capacity #0 to ⅜" fine pitch in mild steel.

A new horizontal version of the same operating principles long used in Snow vertical machines. Snow machines reduce changeover time, and cut tooling costs to a ridiculous minimum. On your next job, let us show you what the Snow method can do. Submit samples and prints.

Snow Manufacturing Company, Dept. A, 435 Eastern Avenue, Bellwood, Illinois (Suburb of Chicago)

SNOW *master fixtures save dollars and days in tooling costs*

AMERICAN

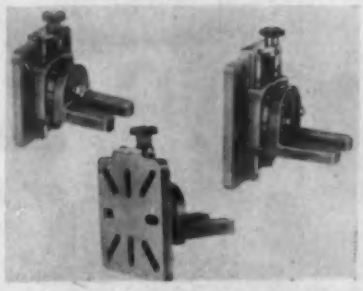
Mass Demand

The Automotive Industry requires precise uniformity for mass production. American Twist Drill has satisfied these growing demands for 41 years. Now they are increasing production fast enough to make American Twist Drills available to all American Industry.

Brown & Sharpe CUTTING TOOLS

American Twist Drill Co.
Detroit, Michigan
Subsidiary of:
Cutting Tool Division
Brown & Sharpe Mfg. Co.,
Providence 1, Rhode Island

AMERICAN



Lathe Milling Attachments Hold Irregular Shaped Work Pieces

New Palmgren No. 250P and 400P plate type lathe milling attachments are designed to hold large or irregular shaped work pieces which are difficult to hold in an ordinary vise type milling attachment.

They have plates of 6 x 6 in. and 9 x 9 in. respectively, and these plates are slotted and machined. Vertical feed in thousandths is provided on each attachment by a micro-screw, and graduated dial.

Chicago Tool and Engineering Co, 8383 S Chicago Ave, Chicago 17, Ill

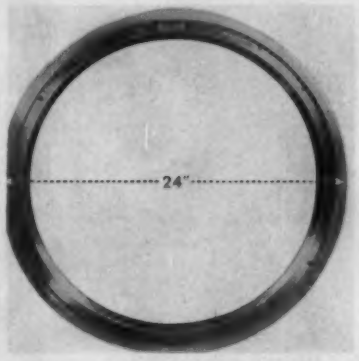
MORE DATA? Circle 116, inside back cover

Timing Controls for Welders Feature Plug-In Panels

Meteor line of electronic timing controls for resistance welding equipment incorporates plug-in panels for easier servicing. Four models are available. A weld timer, Model 1A, controls weld time and is used primarily for a foot-operated welder. A squeeze-weld timer, Model 2A, permits controlled squeeze time before weld time is initiated and can be applied to air-operated welders. Models 3B and 5B are sequence timers premitting finer control and applicability to automatic operations and special applications.

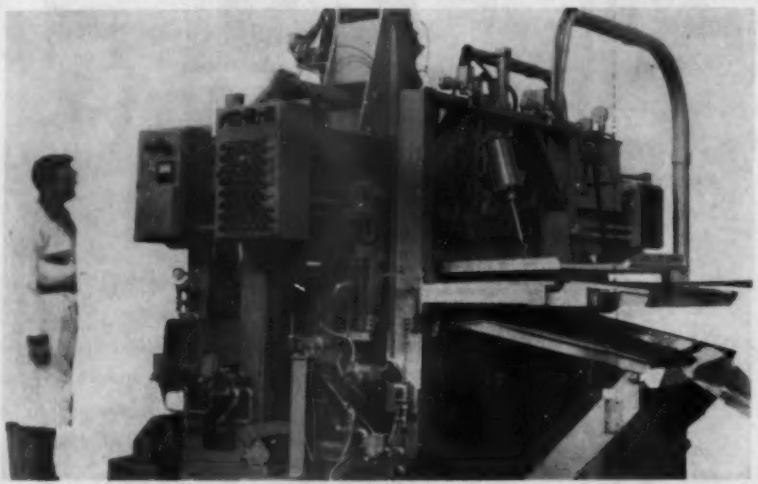
Alphil Spot Welding Mfg Co, 1058 Pacific St, Brooklyn 38, NY

MORE DATA? Circle 117, inside back cover



24-IN.-DIA FACE GRINDING WHEEL, a continuous one-piece metal alloy bond diamond wheel, is reported to produce better finishes and stock removal than segmented wheels as well as to reduce edge chipping, friction, and wheel cost. Wheels are also available for OD grinding applications up to and including 24 in. dia—*Action Diamond Tool Co, 4545 W Grand Ave. Chicago 39, Ill*

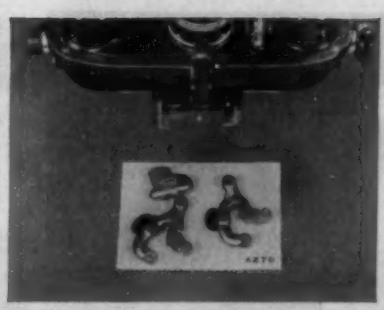
MORE DATA? Circle 118, inside back cover



NARROW LAP SEAM WELDER joins strip ends together for continuous processing in tinning, annealing, and coil prep lines. Total time for strip handling, shearing, and welding is 15 sec for 46-in. strip. Machine can handle strip ranging in thickness from 0.004—0.036 in.—*Taylor Winfield Corp, 1048 Mahoning Ave, Warren, Ohio*

MORE DATA? Circle 119, inside back cover

1) No darkroom loading. Ready for exposure as it comes from the box.



2) Just place in position and expose —the film is protected from dust, dirt, light and moisture.

3) In the darkroom, pull the rip strip, remove film, and process.

...NEW!... READY PACK ....

Kodak Industrial X-ray Film

- Sealed tight until processed—keeps clean
- Very convenient to handle—saves time
- Readily available in Type AA and Type M

Here's new convenience when you are inspecting aluminum or magnesium alloys, thin steels, plastic or anything where lead screens are not required.

Kodak Industrial X-ray Film, Type AA and Type M-Ready Pack comes to you with each sheet sealed in a light-tight envelope ready for exposure. A convenient rip strip makes it easy to open in the darkroom.

These films come 75 to a box in sizes 8 x 10, 10 x 12, 11 x 14, 14 x 17. Order them from your Kodak X-ray dealer.

EASTMAN KODAK COMPANY
X-ray Division • Rochester 4, N. Y.

Kodak
TRADE MARK

Solve it . . .

with **AIR-LOC** Mounting Pads

For isolating and dampening vibration, Air-Loc is the answer. In actual production tests, it successfully reduces vibration up to 85%. Air-Loc is easy to install in a matter of minutes. It can be quickly shimmed for leveling, gives permanent machine alignment . . . and is re-usable.

The scientific cross-grid embossing of Air-Loc machinery pads literally anchors your machines to the floor . . . without cement, without bolts.

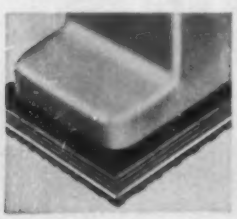
Air-Loc is made of three materials, and each plays its part in giving you the ultimate in easy, yet positive machine mounting:

Cork — absorbs vibrations, shock and noise. The cork used in Air-Loc is specially processed, under patents, to bring out its best physical properties.

Sisal Fibre — selected long-fibred sisal adds strength and stability.

Vinyl — completely surrounds the cork and sisal to give exceptional durability and permanent resistance to oils, alkalies and acids.

Write today for full information and sample.



Air-Loc® DIVISION

Clark, Cutler, McDermott Co.

000 WEST CENTRAL ST. • FRANKLIN, MASS.

NEW SHOP EQUIPMENT

Machine load calculator simplifies the translation of production quantities and rates into shop loads. This device, similiar to a circular slide rule, sells for $7.50—*Van D Mark, St Clair, Mich*

MORE DATA? Circle 120, inside back cover

Machines cut off tubing and shapes into length of ½ in. or more, ±0.010 in., at high rate of speed. Pieces are sheared clean with practically no burr or distortion—*Vogel Tool & Die Corp, 1825 N 32nd Ave, Stone Park, Ill*

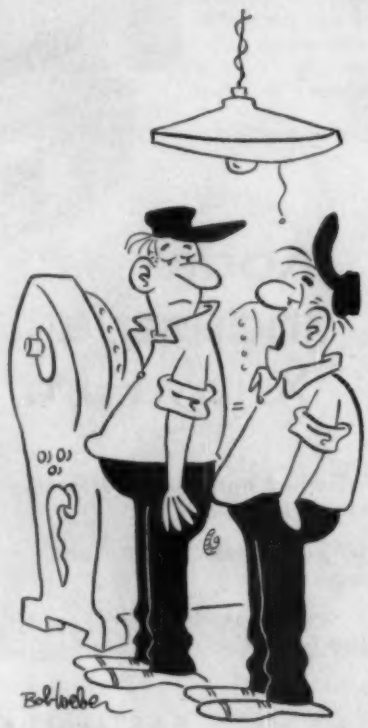
MORE DATA? Circle 121, inside back cover

Master Protractor that jacks into slots and keyways in either vertical or horizontal position, used in conjunction with aluminum angle plate, is reported capable of reducing layout time at least 50%. Guaranteed accuracy is 5 minutes of a degree—*K-M-P Tool Co, 321 Highland Ave, Beloit, Wis*

MORE DATA? Circle 122, inside back cover

Speed reducer, MW109 Ratiomotor, a worm-geared, horizontal parallel drive model, is powered by specially designed 1/20 of 0.035-hp motors and provides output speeds from 1.9 to 70 rpm—*Boston Gear Works, Quincy 71, Mass*

MORE DATA? Circle 123, inside back cover



"Baker told me that he'll be unable to borrow your micrometers this morning, and that I can borrow them instead."

New MODEL 50 equips your lathes to do a lot more for a lot less!

$70.00 for the chuck

$65.00 for the collets

THE WORLD'S MOST MODERN COLLET CHUCK

Designed expressly for ATLAS, CLAUSING, DELTA, LOGAN, SHELDON, and SOUTH BEND LATHES

These and others of similar power and capacity now give top performance when equipped with the new Jacobs Model 50. Improve performance of your lathes. Increase spindle capacity as much as 42%. Get greater accuracy and stronger grip. It's easy and inexpensive with new Model 50 and its companion Rubber-Flex collets.

CONSIDER THESE FEATURES . . .

- **Gripping Power**
  Model 50 is made for heavy duty turning. It has tremendous gripping power.
- **Accuracy**
  Model 50 is factory tested—maximum runout .001" T.I.R. at the nose when properly mounted.
- **Thin Walled and Fragile Work**
  Always parallel Model 50 Rubber-Flex collet jaws permit chucking of tubing and fragile materials without crimping or scoring.
- **Range**
  The 10 Rubber-Flex collets in the 500 Series, developed especially for use with Model 50, cover a greater bar stock range than 63 old-fashioned steel collets. You can chuck any bar between 3/32" and 1-1/16" with this set of 10 collets.
- **Capacity**
  Model 50 eliminates capacity-wasting draw bar. You can increase spindle capacity up to 42%.
- **Adapters**
  Model 50 adapters are fully machined for immediate mounting. Available in all popular threads and American Standard L00 taper.
- **Price**
  Model 50 prices are revolutionary!
  $70.00 for the chuck.
  $65.00 for the complete set of 10 collets.

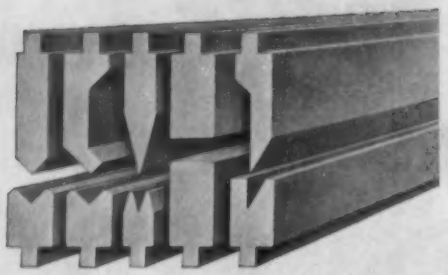
MODERNIZE YOUR LATHES WITH JACOBS MODEL 50 AND RUBBER-FLEX COLLETS. YOU CAN'T AFFORD NOT TO!

See your Jacobs industrial supply distributor. Give him the opportunity to prove these fantastic facts with a convincing demonstration at your desk! Call him today.

Jacobs CHUCKS

The Jacobs Manufacturing Co., West Hartford 10, Conn.

press brake tooling



Standard Type PRESS BRAKE DIES

62 different sizes and styles • Most in stock for off-the-shelf delivery

CHICAGO standard type press brake dies are used for a large variety of bending operations in any make or size of standard press brake. They are economical, and the quick delivery saves time in tooling up. Available in any length from 4 to 12 feet in increments of 2 feet; *induction hardened* or Diekrome steel.

The local distributors listed below offer immediate delivery on many sizes and styles of standard type CHICAGO press brake dies. If you have Bulletin STD-959 you can order any standard type die by number. Why not ask your nearest distributor for a copy? Also, if your requirements call for special multibend and forming dies, he can tell you about Dreis & Krump complete tooling service for any make of press brake.

Call your nearest distributor

ALABAMA
Birmingham
Hinkle Supply Co., Inc.
FAirfax 2-4541

CALIFORNIA
Los Angeles
Meyer Sheet Metal Mchry. Co.
MAdison 2-1477
San Francisco
Tay-Holbrook, Inc.
MArket 1-6800

GEORGIA
Atlanta
Allison Mchry. Co.
JAckson 4-1741

INDIANA
Indianapolis
E. L. Hamston Co., Inc.
WAlnut 5-9691

IOWA
Bonaparte
Corry's Machine & Tool—Phone: 112

KANSAS
Wichita
Elifeldt Mchry. & Supply Co.
AMherst 7-9773

MASSACHUSETTS
Cambridge
Austin-Hastings Co., Inc.
Kirkland 7-4480

MICHIGAN
Detroit
J. Lee Hackett Co.—TRinity 2-6442

MINNESOTA
Duluth
Girard Steel Supply Co.
MArket 8-1061
Minneapolis
Minnesota Steel & Mchry. Co.
FEderal 3-6273
St. Paul
Girard Steel Supply Co.
Midway 6-8635

MISSOURI
Kansas City
Elifeldt Mchry. & Supply. Co.
Victor 2-5494

NEW YORK
New York
Federal Machinery Corp.
CAnal 6-3022
H. Weiss & Co.
CAnal 6-4256

NORTH CAROLINA
Greensboro
Armentrout Mchry. Co.
Phone: 4-8218

OHIO
Cleveland
Wm. K. Stamets Co.
MAin 1-5124
Columbus
Vorys Brothers, Inc.
AXminster 4-4701

OKLAHOMA
Oklahoma City
Hart Industrial Supply Co.
REgent 9-2541
Tulsa
Hart Industrial Supply Co.
LUther 3-2175

OREGON
Portland
Hallidie Machinery Co., Inc.
ATlantic 2-2244

PENNSYLVANIA
Philadelphia
Delaware Valley Mchry., Inc.
OLdfield 9-4600
Milton Equipment Co.
WAlnut 2-1734
Pittsburgh
Wm. K. Stamets Co.
ATlantic 1-8091

TEXAS
Dallas
Briggs-Weaver Mchry. Co.
LAkeside 8-0311
Fort Worth
Briggs-Weaver Mchry. Co.
EDison 6-5871
Houston
Mehl Machinery, Inc.
FAirfax 3-1313

WASHINGTON
Seattle
Hallidie Machinery Co., Inc.
PArkway 3-9520

WISCONSIN
Milwaukee
Production Equipment, Inc.
GReenfield 6-6075

CANADA
A. R. Williams Mchry. Co., Ltd.

ALBERTA
Calgary—Phone: 5-4425
Edmonton—Phone: 24341

BRITISH COLUMBIA
Vancouver—TAtlow 9411
Victoria—Phone: 4-7623

MANITOBA
Winnipeg—SPruce 4-4458

NOVA SCOTIA
Halifax—Phone: 5-4389

ONTARIO
Hamilton—JAckson 9-5388
Ottawa—CEntral 6-3661
Toronto—RUssell 7-2494
Windsor—CLearwater 4-4762

QUEBEC
Montreal—Riverside 8-9381

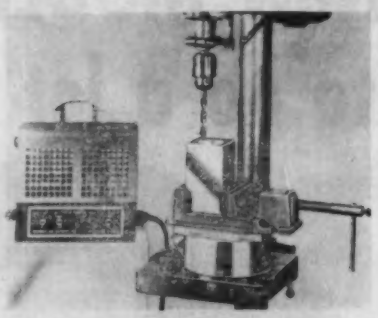
9506

A Tradition of Quality and Value since 1899

Press Brakes • Press Brake Dies
Straight-Side-Type Presses
Hand and Power Bending Brakes
Special Metal-Forming Machines

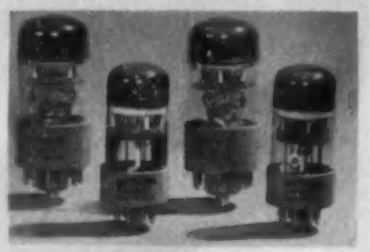
CHICAGO DREIS & KRUMP

DREIS & KRUMP MANUFACTURING CO.
7434 S. Loomis Blvd., Chicago 36, Illinois



ELECTRO-MAGNETIC HOLDING VISE is designed for drill presses, tapping, or milling machines. Other electro-magnetic holding devices with ball joint vise or air chucks are available—*Redmer Air Devices Inc, 7100 30th Ave N, St Petersburg, Fla*

MORE DATA? Circle 124, inside back cover

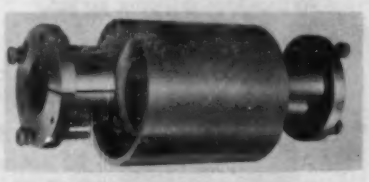


Electron Tubes Count up to 100,000 Units per Second

These new electron tubes count up to 100,000 units per sec and visually display the total on their faces. Called decade counters, they record and indicate the count on ten glowing cathodes in luminescent dials within the tubes. With numbered faceplates, placed on series-connected decade counters, the total can be read visually in units, tens, hundreds, etc, during operation.

Industrial Components Division, Raytheon Co, 55 Chapel St, Newton, Mass

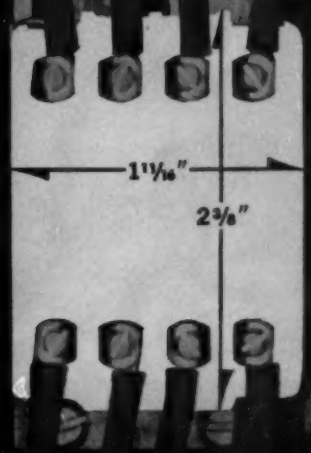
MORE DATA? Circle 125, inside back cover



SURE-GRIP rigid coupling No. 44 will align and rigidly connect two shafts of up to 5 7/16-in. dia. Shafts are clamped by Sure-Grip interchangeable tapered bushings; no press or shrink fits are necessary—*T B Wood's Sons Co, Chambersburg, Pa*

MORE DATA? Circle 126, inside back cover

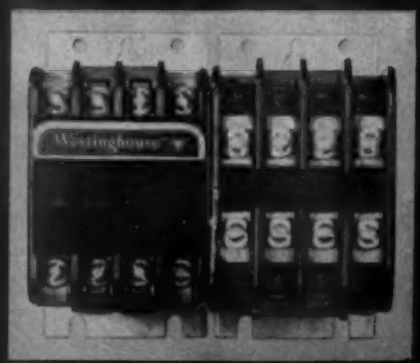
NEW MACHINE TOOL RELAY
cuts panel space



Actual size photo of machine tool panel

new machine tool relay cuts panel space 50%, reduces installed cost over 20%

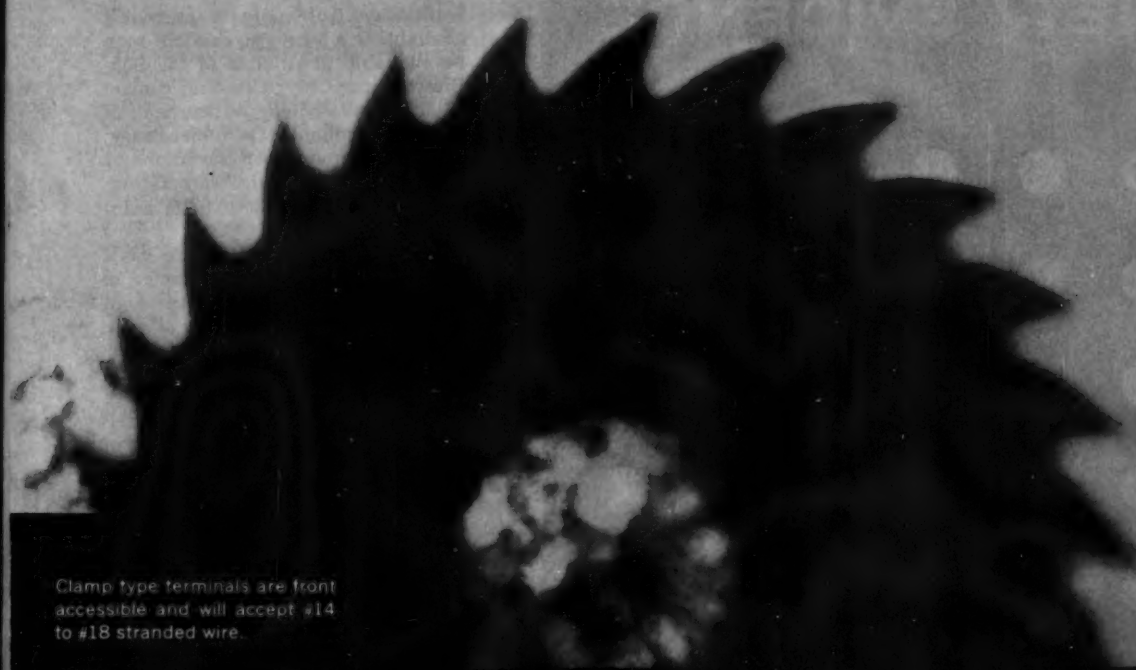
ACTUAL SIZE



Machine tool relay is rated 6 amps, 300 volts a-c, from 2 to 8 poles in 2 basic frames. Relays can be butted against each other to save space.

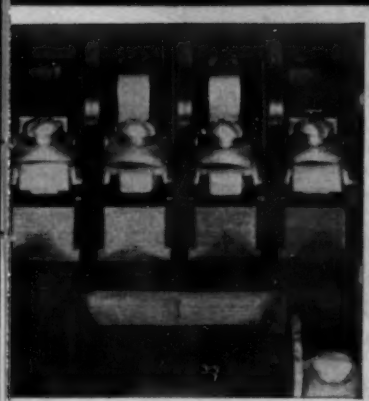
Here's the new Westinghouse relay that cuts the control panel space requirements as much as 50%. Specifically designed for use on automated machine tools, this relay is smaller than any other similar unit available. Relays can be butted against each other in banks. What's more, both 4 and 8 pole frames have the same mounting dimensions, occupy the same panel area, and can be mounted adjacent to each other without additional electrical clearances. ■ Wiring a panel is easier, too. Relay terminals are all readily front accessible. Each of these clamp type connections has a wire stop . . . installation is faster and costs less. You actually save more than 20% over outdated relays. ■ This new relay has load rating of 6 amps, 300 volts a-c—found by experience to be ideal for most of the machine tools now being designed. ■ Want more information? Contact your nearest Westinghouse representative or write: Westinghouse Electric Corporation, Standard Control Division, Beaver, Pa. Remember: You can be sure if it's Westinghouse.

The Westinghouse BF relay is available from stock, now.



Clamp type terminals are front accessible and will accept #14 to #18 stranded wire.

J-30318

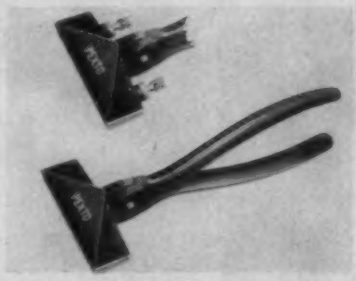


Westinghouse

(Advertisement)

NEW EVIDENCE
NEW EVIDENCE

NEW SHOP EQUIPMENT



PEXTO HAND SEAMERS are available in two models: No. 793 has gages for precise, accurate crimping; No. 794 is furnished without gages for application on variety of changing operations where speed is essential—*Peck, Stow & Wilcox Co, Southington, Conn*

MORE DATA? Circle 127, inside back cover

Self-Adjusting Ultrasonic Cleaner Introduced by Narda

SonBlaster Automatic is currently available in a 5-gal size and will soon be available in all sizes of the SonBlaster line. Only operating control is an on-off switch. Adjustment of the new equipment is unnecessary; compensation for such variations as liquid level, operating temperature, and changes in work load is automatic.

Feature of the unit is use of a modulated saturable core reactor in combination with a multi-resonant transducer. In this device, a controlled spectrum of frequencies excites every efficient resonance of the system. Every transducer resonance is utilized providing uniform distribution of energy and elimination of standing waves.

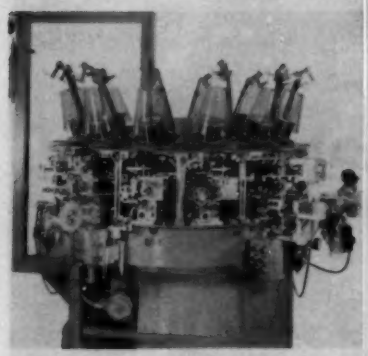
Narda Ultrasonics Corp, Westbury, LI, NY

MORE DATA? Circle 128, inside back cover

SUBMINIATURE ELAPSED TIME indicator, featuring digital readout, weighs just 3¼ oz and operates at 360—440 cps with 2½ watt max power input. Presentation runs to 9,999 hr; numerals are 5/32 in. high—*Waltham Precision Instrument Co, 221 Crescent St, Waltham 54, Mass*

MORE DATA? Circle 129, inside back cover

◄ CIRCLE 263 READER SERVICE CARD



BOBBIN COIL WINDING MACHINE winds 12 coils at once, all in different sizes and wire gages if desired, and all can be taken care of by one operator. It is said to cut coil winding labor costs by 50%—*Read Bros, 203 N Wabash Ave, Chicago, Ill*

MORE DATA? Circle 130, inside back cover

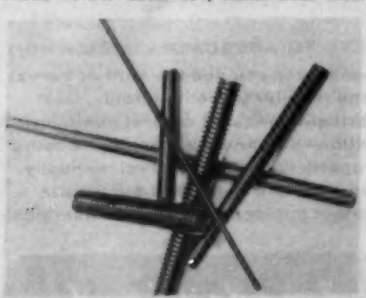
Ultrasonic Plastic Film Welder Provides Air-Tight Joints

The Sewnar enables cold bonding, threadless stitching, sealing, or welding of plastic films and synthetic woven or non-woven fabrics without use of heat or dielectric currents. The device consists basically of an ultrasonic oscillator which feeds 40,000 cycles-per-second current to a special transducer that looks like an oversize ball point pen.

The transducer is designed so that it can be manipulated by hand or mounted in a fixture for automation sealing. No experience is needed to operate the device. The first model, a hand-held unit with provisions for fixture mounting, will be priced at $495 fob.

Ultrasonic Industries, 141 Albertson Ave, Albertson, LI, NY

MORE DATA? Circle 131, inside back cover



CONTINUOUS-THREADED STUDS are available from stock in standard sizes up to 12-ft long. Special sizes, lengths, and materials can be furnished quickly to special order—*Highland Machine Co, 3215 Superior Ave, Cleveland 14, Ohio*

MORE DATA? Circle 132, inside back cover

CIRCLE 264 READER SERVICE CARD ►

...marks superiority of standard V40 Segments

Recent tests conducted on forged die steels proved standard V40 segments by Carborundum to be freer cutting and less costly to use than the nearest competitive type.

Details of these segment tests have been sent to all Carborundum salesmen and distributors for the benefit of other segment users. Grinding B block die sets of uneven heights and with deep pits and heavy scale, the V40 segments outperformed competition by 35% based on overall operating costs. The V40 segments drew less power and ground cooler.

The rate of cut was 38% faster. Abrasive wear was 58% less. The V40 segments used in these tests were National Standards, available as 'shelf stock', by Carborundum.

Ask your Carborundum distributor about this *new evidence* on his next call.

CARBORUNDUM®

Farval Centralized Lubrication on Littell Straightening Machine Eliminates Down-time, Saves Bearings

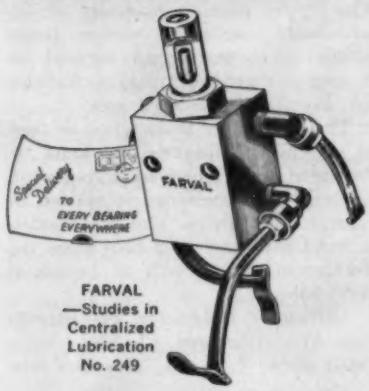
This versatile No. 424 Littell Machine straightens coiled steel stock .050" thick by 24" wide, and automatically supplies a free loop of pre-straightened stock at proper speeds required for smooth, efficient punch-press operation—even through the most complicated progressive dies.

Keeping press output at top level allows no down-time for the Littell No. 424 straightener. Its built-in Farval Manual Dualine System protects the machine's 24 most important bearings—keeps them adequately lubricated while the machine remains continuously on the job.

On industrial equipment all over the world, Farval delivers measured amounts of clean lubricant at regular intervals to all vital bearings. From a central station, lubricant is pumped under pressure to a measuring valve at each bearing, providing the exact amount of lubricant desired.

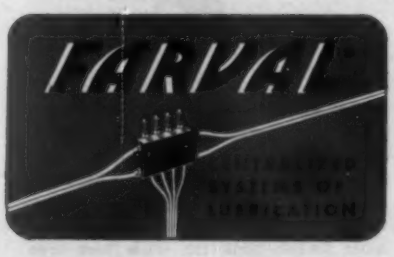
If you want your production equipment to stay in top-operating condition—to reduce costs, boost profits—then write for free Bulletin 26-T. It tells the complete "Farval Story".

Farval Division · Eaton Manufacturing Company
3254 East 80th Street • Cleveland 4, Ohio



FARVAL
—Studies in Centralized Lubrication
No. 249

KEYS TO ADEQUATE LUBRICATION
—wherever you see the sign of Farval—the familiar valve manifolds, dual lubricant lines and central pumping station—you know a machine is being properly lubricated. Farval manually operated and automatic systems protect millions of industrial bearings.



A O Smith to Build Advanced Research Center

Ground will be broken this fall on an 80-acre tract of land on the northwest edge of Middleton, Wis, by A O Smith Corp for a research center estimated to cost $2 million. It's planned to begin activities in the new facility by middle of 1961.

Research in the new laboratories will be devoted to advanced fields in solid state physics and physical chemistry of materials as well as the energy processes involved in the utilization of such materials. In addition, new product developments making use of the output of this research will be undertaken.

Ingalls to Start on New Sub Keel

Ingalls Shipbuilding Corp, Pascagoula, Miss, will begin keel work next month on a nuclear-powered attack submarine of the USS Thresher SS/N/593 class. Minimum contract price of the ship is $23,405,750. Ingalls is now building two subs of the Thresher class attack group in addition to two other nuclear subs of the Skipjack class.

Henry Ford of the Pyramids

An automotive industry has been started up and is doing fine on the desert some 12 miles west of Cairo. Established by 39-year-old George Hawi, an Egyptian engineer with experience in Britain and the US, the plant's assembly line is turning out five vehicles a day. Mr Hawi expects eventually to export the car throughout the Asian-African world.

Wide base of the car (called the Ramses after the kings of ancient Egypt), plus its tapering body, and the straight, parallel lines of the front grille were inspired by the architecture of the Pharaohs. Air-cooled engine is in the rear. A two-door, four-seat model is priced at the equivalent of $1680. It's also available as a jeep-style utility car and as a sports roadster. Sales are no problem, according to Cairo reports. Ramses showrooms are drawing crowds more than a month after the first models went on display. Six months' orders are on the books.

Auto bodies emerge from under-body dip at new assembly plant of Ford Motor Co of Australia Pty Ltd at Broadmeadows, Victoria. Largest automotive assembly building under one roof in Australia, the structure is 1050 ft long, 715 wide, and is built on a 400-acre site. Company is engaged in a $51.8 million expansion plan, of which the Broadmeadows project is part. It will produce there an Australian car similar to the Falcon with a 90% local content

West Germany's Henschel-Werke To Celebrate 150th Anniversary

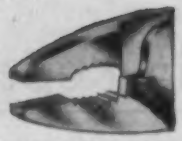
Henschel-Werke GmbH of Kassel, a leading producer of heavy industrial and transportation equipment whose 1960 sales are estimated to reach more than $100 million ($60 million in 1959), will celebrate the 150th anniversary of its founding on Oct. 15. The company employs more than 13,000 workers in its three production facilities in Kassel.

The company started out as a foundry and manufacturer of locomotives in 1810; after WWI, trucks and buses were added to the production program and the Henschel-Lanova-Diesel engine was developed. The Henschel Works, after being 80% destroyed during WWII, was rebuilt completely and has added a variety of heavy equipment to its product lines, and developed extensive research departments.

Last year Henschel concluded several licensing agreements with US corporations, among them E W Bliss Co of Canton, Ohio, with which, in a joint venture, the Bliss-Henschel Corp of Duesseldorf was formed. This firm has begun to mar-

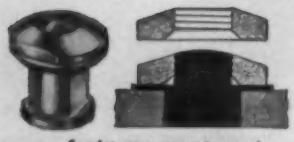
McGIRK'S WORKS by GEO CRENSHAW

YOU'RE THE WORST EXAMPLE OF EFFICIENCY IN THIS PLANT! I CAN'T TRUST YA FOR FIVE SECONDS!...
...YOU'RE ALWAYS LATE FOR WORK! YA TAKE TOO MANY COFFEE BREAKS, TOO MANY SMOKE BREAKS - YOU'RE LAZY, STUPID, UNCOOPERATIVE!....
...AND SOMETIMES I THINK EVERY WORD I TELL YOU GOES RIGHT IN ONE EAR AND OUT THE OTHER!
MOE'S CORNER
If you must know, it's a HALF WHEELBARROW LOAD.

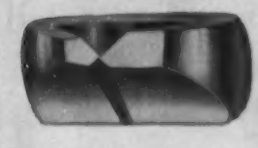


Flat end snubs against object and grips where rounded nose pliers would fail.

Deep cut-teeth provide secure grip. Curved sections have large, deep-broached teeth to grip pipe, etc.

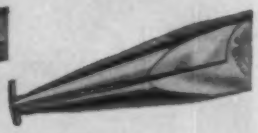


Special slotted washer and chamfered nut provide lock-washer action — will not work loose.



Overlap shear action cuts better — saves edge . . . provides non-slip action.

Star chamfer holds rivet from turning — holds jaws in alignment.



Special hardening and precisely machined joints keep needle-nose jaws in line.

Tips for Measuring the Real *Work Ability* of Pliers

Check the photos above. Shown here are features you have a right to expect in a plier or cutter — features you *get* when you buy SNAP-ON.® In addition, SNAP-ON gives you —

Through hardening for extra toughness.

Broached stud-positioning hole for true bearing surface and snug, easy-working joint.

Drilled and reamed rivet holes on needle-nose for easy use.

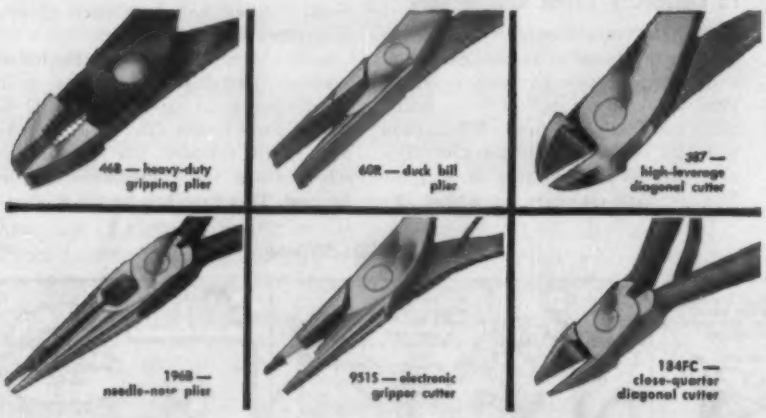
Broached and ground joint surfaces for smooth operation, snug fit.

Engineered handle design for correct leverage.

Over 60 models and sizes to let you choose the best one for your production or maintenance job.

Your SNAP-ON Sales Engineer can give you more information on the complete plier line. There's a SNAP-ON Branch Office in every major U.S. industrial center.

Or write for catalog listing the complete series, plus full range of wrenches and hand tools.


468 — heavy-duty gripping plier
60R — duck bill plier
387 — high-leverage diagonal cutter
196B — needle-nose plier
9515 — electronic gripper cutter
184FC — close-quarter diagonal cutter

FOR ALL INDUSTRY

SNAP-ON TOOLS

8025-J 28th AVENUE • KENOSHA, WISCONSIN

ket the complete line of Bliss heavy equipment throughout the European Common Market. Another licensing agreement was signed with Prodex Corp of Fords, NJ, for manufacture of Prodex plastics extrusion line. Prodex is building the Henschel Fluid Mixers which have been shipped abroad for chemical, plastic, and other industries.

Custom Molding Facilities Expanded by Norton Labs

Norton Laboratories, Lockport, NY, producer of precision molded plastics, has installed new equipment and added personnel. Injection molding facilities now include 12 presses ranging from 1 oz to 16 oz, both vertical and horizontal types. Sixty-one compression presses from 40 to 500 tons, both compression and top transfer types, are also in service, plus three completely automatic machines for molding thermosetting compounds.

Westinghouse Air Brake Takes Over Petch Companies

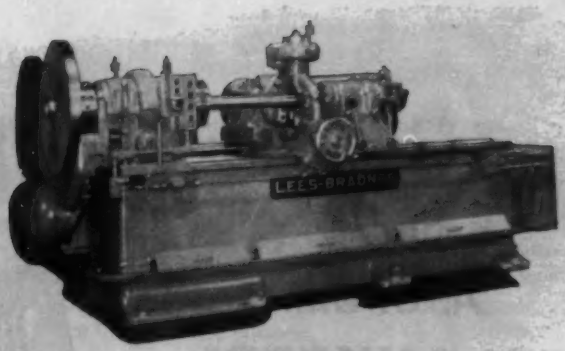
Assets and business of Petch Manufacting Co and Petch Industries, Alpena, Mich, manufacturer of pneumatic and hydraulic cylinders, fluid power control panels, and aircraft flight control units, have been purchased by Westinghouse Air Brake, Co, Pittsburgh. Alpena plants will be operated by the Industrial Products Division of Westinghouse.

RCA Building in Florida

Radio Corp of America has broken ground near Palm Beach for a $4 million plant to make its Series 301 electronic computer systems. Operations are expected to begin by January.

(continued on p 192)

"Checked which end of the shaft has left-hand threads?"



LEES-BRADNER
SH-SPLINE HOBBER

FEATURES FOR THE FUTURE!

Your machine's future is *your* future. A second look at your equipment may indicate a *limited future;* a need for replacing tired, worn-out machines.

If so, it will pay you to think of Lees-Bradner first, an honored name in hobbing. And with that thought, remember to think of the Model SH spline hobbing machine, the machine with built-in *features for the future.*

An exclusive with the SH is its 6 inch capacity, "feed through spindle". It permits hobbing long and bulky parts with maximum speed and efficiency. Continuous splines up to 102 inches in length and 8¾ inches in diameter can be hobbed quickly, accurately. Spur and helical gears may be hobbed with equal ease.

But, get *all* the facts. See your Lees-Bradner representative, or write direct. No obligation, of course.

IMPROVING GEARS . . . FOR 50 YEARS!

the LEES-BRADNER Company
CLEVELAND 11, OHIO, U.S.A.

IF YOU THREAD OR HOB . . . GET A BETTER JOB WITH A LEES-BRADNER

A. O. Smith
"BLANKETS"
its line . . .
new
EXTRA LIFE
INSULATION
at no extra cost
COPYRIGHT 1960, A. O. SMITH CORP.

HARD-RUNNING HORSES STAY HEALTHY WITH THERMOSEAL INSULATION ON ALL A. O. SMITH INTEGRALS & FRACTIONALS

Protective coloring! The blankets on the horses of A. O. Smith are a "cool" green — cool because new Thermoseal insulation system can accommodate a significantly greater temperature rise... more horsepower in a smaller frame. This means extended life and dependable operation under the most adverse operating conditions.

All the horses of A. O. Smith have this blanket protection at no extra cost. For the complete story on Thermoseal, mail the coupon.

protection with THERMOSEAL® insulation

INSULATING VARNISH on all A. O. Smith motors exceeds requirements for Class F, B and A ratings. This clear, thermosetting polyester also has high dielectric strength — maintains it under Class F as well as less severe conditions. High resistance to moisture, chemicals and oils — surpasses MIL-V-1137A requirements for resistance to fresh water immersion and resistance to salt water and acid.

SLOT AND PHASE INSULATION is of mylar type. Insensitive to moisture with high resistance to solvent and chemical attack. Dielectric strength is greater than almost any known flexible insulating material . . . tensile strength is greatest of any plastic fiber. Operating temperature range of -60° C to 150° C. All these qualities in a single film that won't dry out or become brittle with age.

MAGNET WIRE INSULATION — Choice of two at no extra cost! Polyvinyl for maximum moisture protection (standard unless specified otherwise). Or new Polyester for greatest thermal resistance (meets Class F specifications). Polyester type is outstanding in initial dielectric strength and retention of this property at operating temperatures and after exposure to humidity.

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• Tells how to select Ideal Gold Band Live Centers to fill your needs exactly. Over 40 different sizes and styles in 4 models—**Universal, Pipe Point, Multi-Duty, Heavy-Duty**—custom quality performance at production prices.

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Big Tool and Die Plant To Be Built in Israel

Samuel Oritt, president of Dwyer-Baker Electronics Corp of Miami, Fla, has been authorized by the government of Israel to construct a $1 million tool and die plant at Kiryat Gat, south of Tel Aviv. Mr Oritt signed agreements for the project with the Israeli government during a recent visit to that country at its request.

Under terms of the agreement, the plant will be built and operated as an "approved enterprise" with special tax and other concessions, by a subsidiary of Dwyer-Baker, known as Orisco. When the first phase of the project is completed and in full operation, the plant will cover 30,000 to 50,000 sq ft of space, employ 600 to 800 workers, and turn out, in addition to tools and dies, a variety of aluminum products used in construction. Plans for the new factory were made as a result of a survey conducted by Oritt and Israeli officials which indicated an urgent need for this type of facility to serve the country's aircraft and military industries and to speed modernization of construction methods.

The Miami plant of Dwyer-Baker currently manufactures various component parts for leading electronics and missile firms in the US and is one of Florida's larger fabricators of a variety of metal products.

Nickel Anodes Added To Metal & Thermit Line

M&T, headquartered in New York, is handling International Nickel Co's nickel anode products along with its own electroplating line. Company can now offer complete product and service facilities to nickel platers. It's already a supplier of nickel salts and addition agents to the industry and it maintains a field service laboratory that's available for consultation on the application of M&T plating products and for help in solving plating problems in customer plants.

Federal Pacific Forms International Company

Federal Pacific Electric International S A, a marketing and manufacturing company headquartered near Zurich, Switzerland, has been established by Federal Pacific Electric Co of Newark, NJ. FPE International will be responsible for manufacturing and marketing of both FP electric products and Cornell-Dubilier electronic components in all countries of the world except the US and Canada.

Silvercrown Ltd, London . . .

. . . England, has been licensed to manufacture and sell the complete line of precious metal plating products made by Technic Inc of Providence, RI. British firm is one of Europe's largest producers of electroplating equipment and materials for industrial, defense, and decorative use. Products will be made for sale in England, the Commonwealth except for Canada, and throughout Europe.

Lockheed Drops Research Workers

Because of Air Force nuclear research and testing cutbacks, Lockheed Aircraft's nuclear research branch of the Georgia Division is making its second cut in personnel since Jan 1. In May the branch declared a surplus of 31 persons and as of Sept 11 it chalked up an additional reduction of 65, leaving a work force of approximately 250. In addition to AF contracts, the branch is doing work for NASA, the AEC, and the Army.

Steel Furnace Scheduled For Carolina

The Carolinas are getting their first steel furnace and rolling mill. Florida Steel Corp, Tampa, has pinpointed the outskirts of Charlotte, NC, as the site for $3.3 million facility for producing reinforcing bars. Capacity of the new plant, which will serve the Carolinas primarily, will be 51,000 tons annually. Company also plans to include on the 100-acre site facilities for fabricating the reinforcing bars coming from

(continued on p 195)

"He never lets you forget he worked up from the shop."

P.U.P.S. are a refined standard drawn from A.S.T.M.E. Standards

8 out of 10 times

PUPS

PROVEN USAGE PUNCH SIZES

make all the holes you need!

No more exasperating delays waiting for punches!

No more complex and costly punch inventories!

No more down-time waiting for a replacement punch!

No more assembly nightmares from holes in parts that won't do the job!

Hole sizes you need are few and simple because most needs for holes are already highly standardized, (screws, rivets, wires, shafts, etc). Hole sizes **specified,** however, are several times more numerous because product engineering has had no basis for standardization.

Hole sizes thus **produced** are no less than a multitude and you are either stocking, making or buying replacement punches and dies for every one of that multitude!

Die builders have had no practical standard punches and dies readily available at low cost. They have not been able to use the tolerances allowed so that punch size specification was decided by "rules of thumb."

Dayton's **P**roven **U**sage **P**unch **S**izes correct all this and simplify your specifications, your dies and your products, because 8 out of 10 times they make all the holes you need!

ACTUAL USAGE PROVES SUCCESS! A major appliance manufacturer reports impressive savings resulting from a reduction of 186 punch diameters that had to be maintained, to only 17 P.U.P.S. now doing a better job with fewer problems.

Get low first cost and fast replacement right off the shelf . . . improve production with quality tools and cut replacement costs, down-time and inventory with Dayton's Proven Usage Punch Sizes!

Dayton's P.U.P.S. are being Stocked From Coast to Coast!

For more information about this revolutionary concept of interchangeable perishable tools from local stock and the name of your nearest Distributor, simply tear off this perforated card and mail it today.

name _____

title _____

company _____

address _____

city _____ state _____ phone _____

the mill. Construction will begin this fall with completion scheduled for mid-1961. Since scrap metal is one of the principal exports, tonnage-wise, of the Carolinas, the new Charlotte mill is expected to obtain all the scrap it'll need from within the area. Between 55,000 and 60,000 tons of scrap will be bought annually.

Spur for the new project was the recent acquisition by Florida Steel of Easterby & Mumaw, Inc, a Charlotte-headquartered steel fabricating firm with plants in Charlotte and Raleigh. Combined sales for the newly merged companies were $33.5 million for the fiscal year ended Sept 30 1959.

First Norelco Hydrogen Generator Installed in Detroit Plant

First Norelco generator which will produce 1000 cu ft per hr of ultrapure hydrogen (less than 50 parts per million of impurities) has been completed by Cryogenerators, Ashton, RI. The machine was built for Hamler-Lewis Ltd, Chicago distributor of anhydrous ammonia, for installation in the plant of Commercial Steel Treat at Detroit.

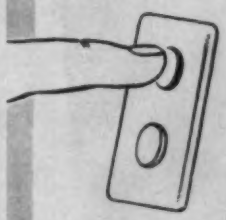
About 47,000 million cubic feet of hydrogen were used in US manufacturing plants in 1959, according to Dept of Commerce figures—a 17% increase over 1958. Norelco officials feel that the new machine will make it economically feasible for many small manufacturers to use gaseous hydrogen for reducing and heat treating of metals.

CIT Forms New Leasing Firm

M&E Leasing Corp has been formed as an affiliate of CIT Corp, the nation's largest industrial financing company. Both M&E and CIT

"It said 'Push'."

You're all SET TO GO with

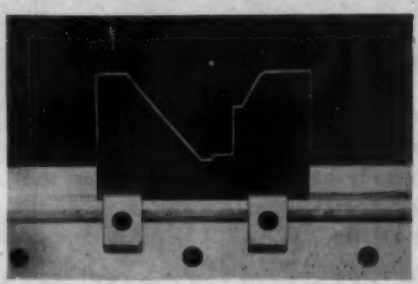


MIMIK® TRACER

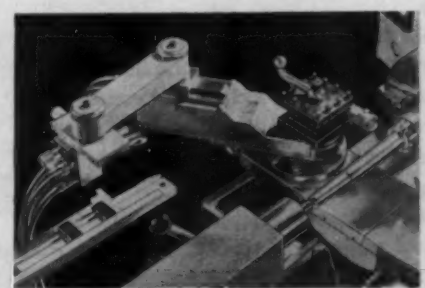
and **TEMPLATOR®**

Work direct from drawings with short runs and run-of-the-mill parts.

Set up time is virtually eliminated with the Mimik Templator and Mimik Tracer. Now you can cut a precision template in double quick time just by reading off your profile measurements and angles on to the simple Templator controls. With the Mimik Tracer taking one-third the time of conventional methods, it is easy to see how production bottlenecks can be eliminated and substantial cost savings achieved.



.003" template sandwiched between sheet plastic and precision cut by Mimik's exclusive Templator method, clamped ready for tracing.



Mimik Tracer head and single point tool does all the work. Super-sensitive stylus traces from template or master to below ±.001.

New and Faster

The Templator, exclusive to Mimik, reduces tracing time still further by enabling you to produce a template on any quill type vertical mill in 45 minutes. Now you can go straight from the drawing to the finished part in two easy steps, faster than ever before and with unparalleled accuracy. The Templator and the Mimik Hydraulic Tracer give you a perfect production team geared to meet sudden switches in production and impossible deadlines.

Only **MIMIK®**

Has These Exclusive Features

Reverse contouring and automatic lubrication are important features developed exclusively for Mimik Tracers. In addition, when you buy a Mimik Tracer you can have a definite guarantee of time and performance related to a specific job and machine.

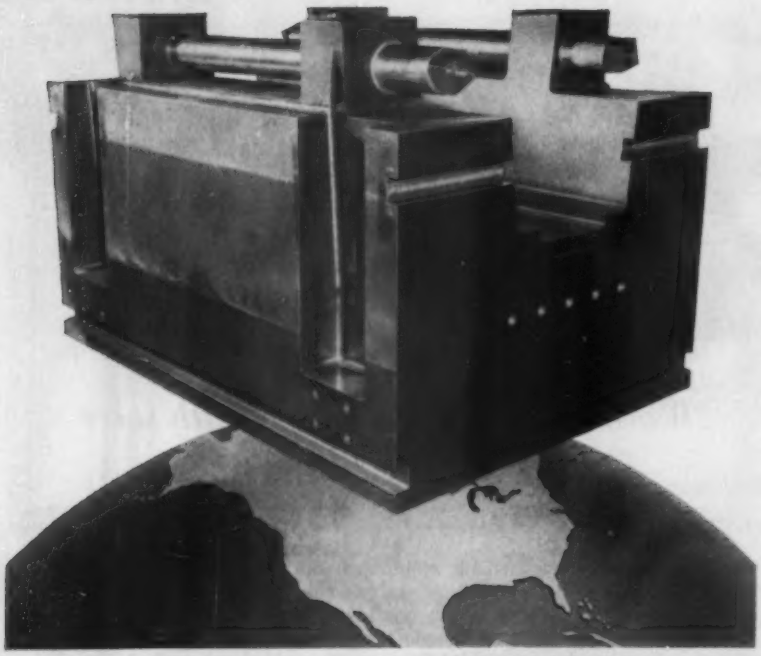
Write for Mimik Tracer and Templator folders and name of your nearest distributor today.

MIMIK TRACERS INC. BUFFALO, N.Y.

WEST COAST: Allied Pacific Manufacturing Co., Compton, California. CENTRAL: Bartsch Tool Corp., 3714 Oakton St., Skokie, Ill. CANADA: Retor Developments Ltd., Galt, Ontario.

MIMIK® TRACERS

A velvet touch and a tiger's response



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35 MILES UP*

TO MAKE THIS 36,000 POUND DIE HOLDER

*The Finkl Process of vacuum degassing steel in the ladle duplicates the atmosphere found at an altitude of 35 miles above the earth.

In this rarefied atmosphere, unwanted hydrogen, oxygen, non-metallic inclusions, and other impurities are literally boiled out of the molten steel, producing cleaner, tougher, stronger, more ductile, flaw-free products.

This 36,000 pound, 40" x 44" x 64" die holder is used in a heavy duty press. It was made of Finkl FX analysis, Temper 4, and finished machined in our shops.

All Finkl die blocks and hot work die steels are made from vacuum degassed electric furnace material produced in our own melt shop. Because of the clean, greatly improved qualities, you get more forging production, less downtime due to breakage, and savings in fewer tool regrinds.

You get more from Finkl in quality, continuing research, and engineering service. Call your Finkl representative for your forging, hot work die steel, and die block needs.

DIE BLOCKS · FORGINGS · HOT WORK STEELS · ELECTRIC FURNACE STEELS

SPECIFY FINKL DIE BLOCKS FOR "IMPRESSIONS THAT LAST"

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Corp are subsidiaries of CIT Financial Corp, diversified financing organization headquartered in New York.

M&E is prepared to purchase machine tools and other manufacturing equipment for lease to users. CIT Corp has specialized for many years in the long-term financing of machine tools and other durable items. Now, with the services of M&E available, the companies and the customer can consider and decide whether a purchase or lease arrangement is better suited to the individual situation.

American Brass Adds to Name

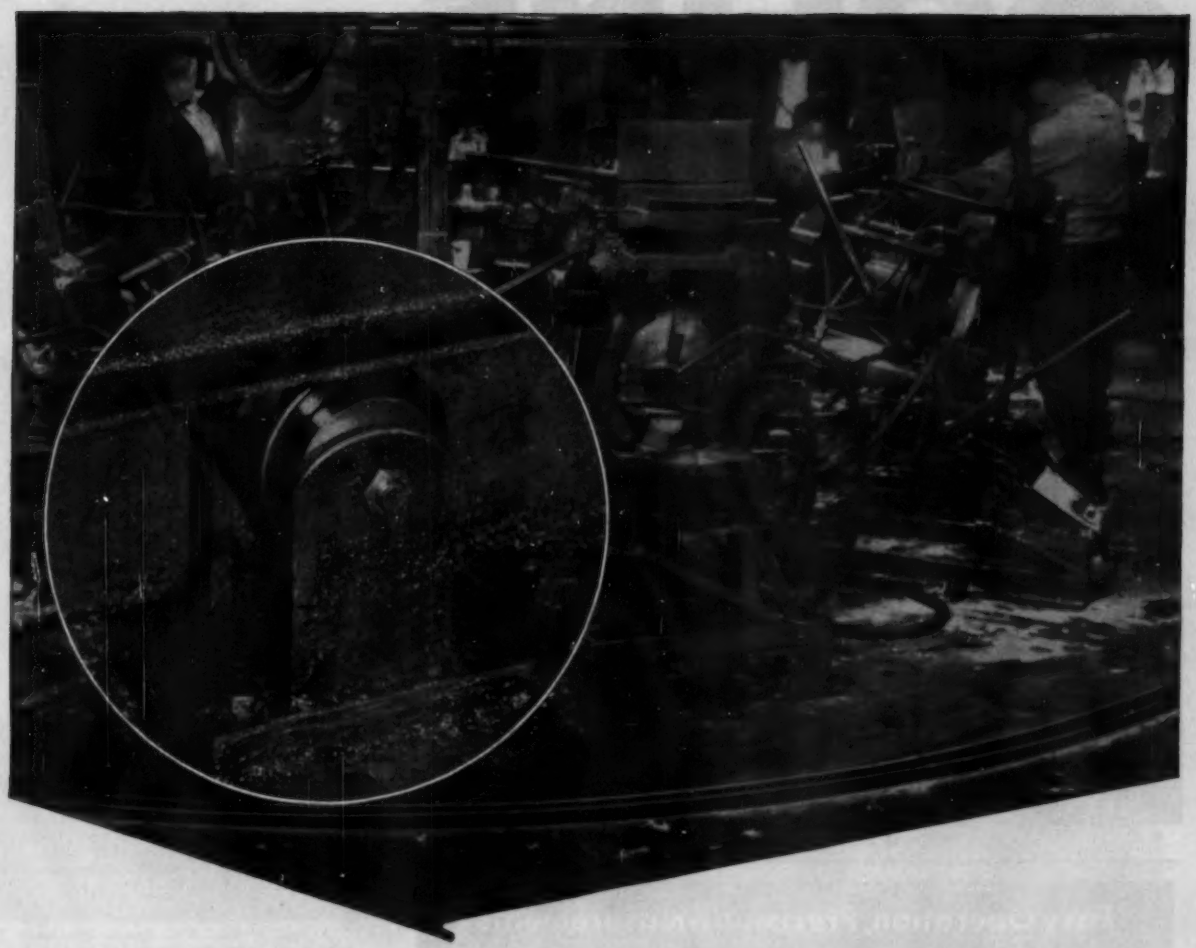
American Brass Co, copper and brass mill product manufacturer, is changing its name to Anaconda American Brass Co as of Oct 3. A wholly owned subsidiary of Anaconda Co, it'll continue to headquarter in Waterbury, Conn, and the name change will not affect operating policies. Company points out that since the end of WWII there's been a decided trend in its business toward advertising, marketing, and packaging its goods under the brand name Anaconda and feels it's only logical to identify brand name with company name.

Barry Controls-Wright Line Merger OK'd by Stockholders of Both

Merger of the two firms, in the works for the last few months, has received final approval; new company will be named Barry Wright Corp with R Perry Collins, Wright president, as chairman of the board, and Ervin Pietz, Barry head, as president and chief executive officer. Headquarters will be in Watertown, Mass, home of Barry which makes shock and vibration isolators and isolation systems. Wright supplies equipment and accessories for data processing and computing industry.

Mercury Tool & Die Co . . .

. . . Detroit, has been sold to a group of midwest industrialists who are the principal stockholders of Pheoll Manufacturing Co, Chicago. Mercury will continue its operations with Harold P Fischer as vice president and general manager. The company has recently completed a 4500 sq-ft expansion (third to the original building) that includes a 10-ton electric crane which travels the entire length and covers the width of the new structure.



Bearings, Inc. turned this turntable from a costly maintenance problem into a smooth, trouble-free operation!

Our customer, an aluminum foundry, designed and built this system for continuous and automatic pouring of permanent mold castings. The turntable is approximately 20 feet in diameter. Supporting the table, which weighs several tons, were 20 large, double-row bearings. The life of these bearings was only a few weeks and their cost, plus downtime, was becoming increasingly expensive.

Our bearing engineers were asked for a solution and, after an investigation, recommended a camroll bearing. Now, after many months of operation, all turntables in the plant are equipped with the bearings we recommended and there has not been a bearing failure in that period!

If you have a problem involving bearings, call the Bearings, Inc. branch nearest you for expert help. We are the authorized distributor for all the bearings we sell —your guarantee that the bearings we deliver will be of the latest manufacture and right for your application!

Providing bearing service

in the North ➤ **BEARINGS, INC.**

DELAWARE: Wilmington • **ILLINOIS:** Neiman Bearings Co., E. St. Louis • **INDIANA:** Ft. Wayne • Indianapolis • Muncie Terre Haute • **MARYLAND:** Baltimore • **MISSOURI:** Neiman Bearings Co., St. Louis • **NEW JERSEY:** Camden • Newark **NEW YORK:** Bolanrol Corp., Buffalo • Niagara Falls • **OHIO:** Akron • Canton • Cincinnati • Cleveland • Columbus • Dayton • Elyria • Hamilton Lima • Lockland • Mansfield • Painesville • Toledo • Youngstown • Zanesville • **PENNSYLVANIA:** Erie • Johnstown • Philadelphia • Pittsburgh • York **WEST VIRGINIA:** Charleston • Huntington • Parkersburg • Wheeling

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Use rugged, reliable "Hole Hog" machine tools for such jobs as:

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Twenty-Station, Ten-Unit Transfer Machine for boring, counterboring, chamfering and valve clearance operations on V-8 automotive engine blocks. (Shown)

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Easy Operation, Precision Measurements ...with Wilson "Rockwell" Hardness Testers

No matter what your hardness testing requirements are, there's a Wilson Rockwell instrument to do the job easily and accurately. Wilson instruments on the production line and in the laboratory offer these advantages:

Accuracy—Precision-built, with exact calibration, for consistently correct results.

Easy operation—Even an unskilled operator can get perfect readings. All controls conveniently grouped.

Long life—Simple design, rugged construction make Wilson instruments as durable as a machine tool.

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Complete line—Choose from the widest variety of instruments available, including semi and fully automatic models and Wilson "Brale" diamond penetrators.

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MACHINES AND ATTACHMENTS

1 INCLINABLE POWER PRESSES—*Cleveland Punch & Shear Works Co, 3917 St Clair Ave, Cleveland 14, Ohio.* 8-page folder OBI-3 '60 covers new welded steel line of OBI presses in 75 to 200-ton capacities. Selection chart shows the standard-extra features incorporated in these units.

2 HONING — *Barnes Drill Co, 830 Chestnut St, Rockford, Ill.* 16-page catalog 200 describes internal, external, and straight line honing. Development of honing and the honing process are explained and typical honed parts are illustrated. Charts list spindle speeds and coolants for various honing operations. Included are illustrations and specifications for the company's line of honing machines, tools, and abrasives.

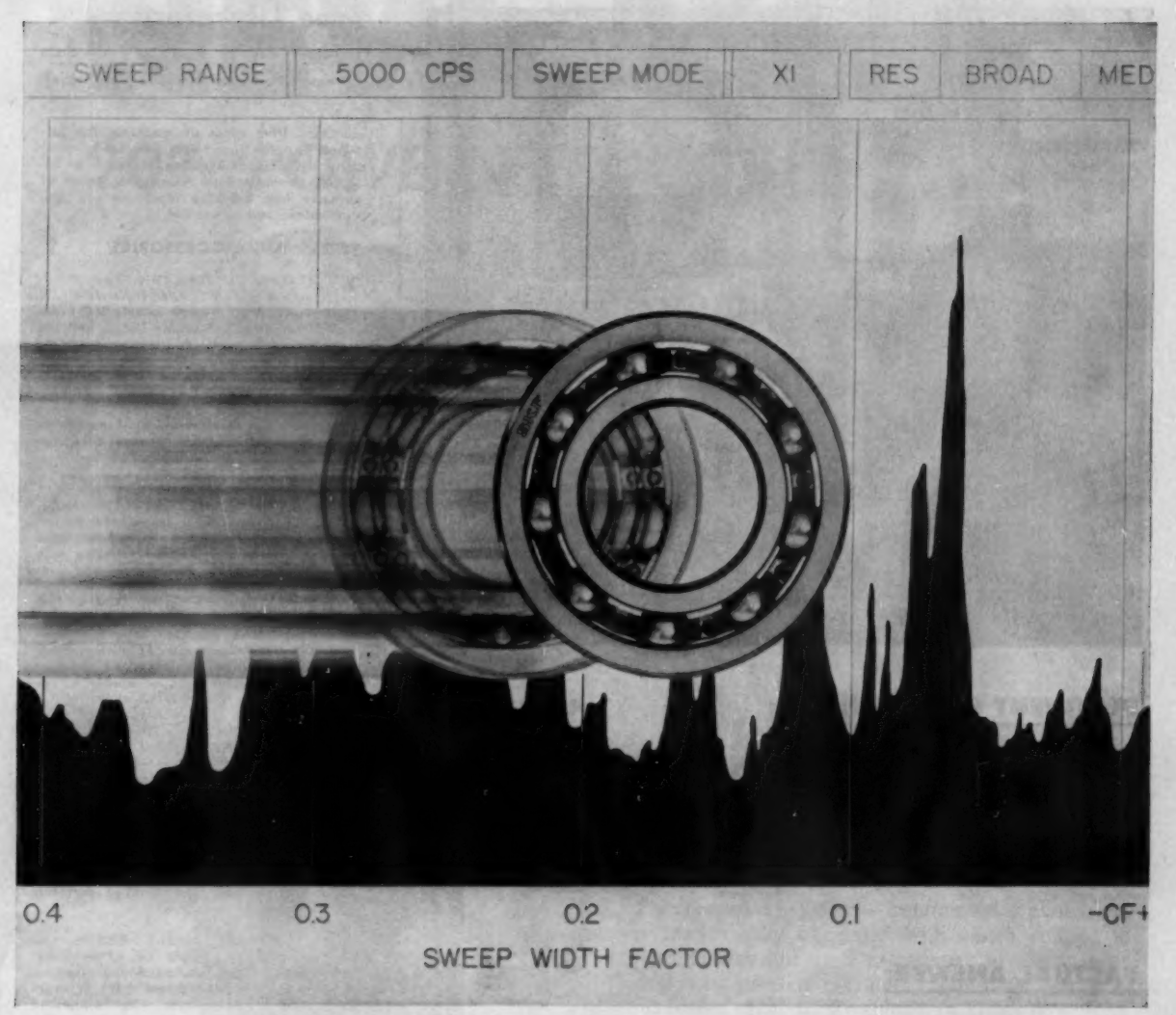
3 SWAGING MACHINES—*Fenn Manufacturing Co, Fenn Rd, Newington, Conn.* 20-page catalog SM-60 covers full line of machines, feeding accessories, and related equipment. In addition to complete information on capacities and dimensions of each of the nine basic machines in the line, data is included on applications and advantages of swaging, long die swaging, quality tests for swaging machines, hydroforming, die designs, care and operation, and installation.

4 TRANSFER PRESSES—*Baird Machine Co, Press Division, 1700 Stratford Ave, Stratford, Conn.* 8-page illustrated brochure describes in detail the five standard machines in the line as well as typical applications involving use of the machines for high production of stamped and drawn parts. Complete specifications are included.

5 20-TON TRIM PRESS—*K R Wilson Inc, Arcade, NY.* 4-page illustrated bulletin 67 gives details on self-contained, semi-automatic unit designed for trimming of die castings, molded plastics or rubber. The 4-column downstroke hydraulic press has 18 in. max stroke; 26-in. max daylight; 8-in. min shut height; work areas of 30 in. R to L, 20 in. F to B. Speeds are: differential close, 660 ipm; close, 330; press, 130, return, 660.

6 GRINDING AND POLISHING MACHINES—*Acme Manufacturing Co, 1400 E Nine Mile Rd, Detroit 20, Mich.* 4-page illustrated catalog AM-6 gives details on complete line of flat surface units for finishing and deburring parts such as sheets, bars, stripes, coils, blanks, stampings, forgings, die castings and sand

"Allow me to introduce myself, driver— I'm the plant safety director!"



Now, SKF reduces the noise level of ball bearings by 50%!

New SKF ball bearings run twice as quietly as standard single-row deep-groove bearings – six times more quietly than bearings produced just two years ago.

They're designed especially for applications where noise is an important factor. Eight manufacturers, who use-tested them for over a year, now back-up their approvals with repeat orders.

Every bearing meets new, more critical standards. Each type and size meets special requirements for reduced vibration. Every ball meets very low waviness limits. Each cage meets critical standards for smooth, quiet performance.

SKF will make a comparison check of these improved bearings against the bearings you're now using. See for yourself! Just call the SKF branch office nearest you. 6013

Spherical, Cylindrical, Ball, "Type" Tapered and REED Miniature Bearings

EVERY TYPE—EVERY USE

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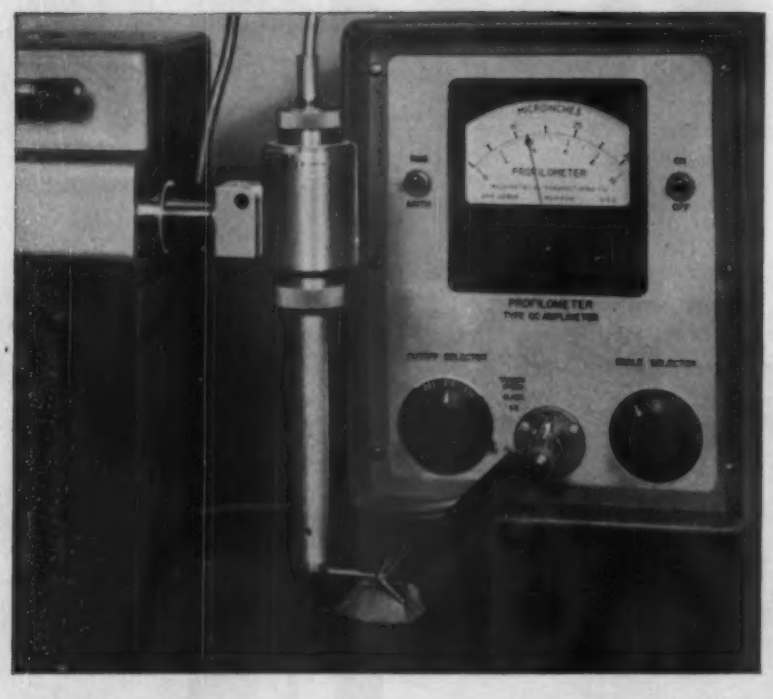

PERTINENT QUESTION:

WHY do you need the Profilometer®?

FACTUAL ANSWER:

To check practically *all* surfaces against microinch roughness specs —and to help cut production costs in 7 different ways.

FREE BULLETIN LT14 gives details on the Profilometer and its practical applications. May we send you a copy?

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castings. Five types of machines for different applications are described; complete list of specifications for each is included in chart form. Six other types of abrasive belt finishing machines are also illustrated and described.

TOOLS AND ACCESSORIES

7 UNITIZED TOOLING—*Tool Products Corp, 377 Old Falls Blvd, N Tonawanda, NY.* 16-page catalog MO-6 describes Series RD (Regular Duty) unitized tooling for the metal fabricating industry. This line of perforating units for mild steel up to a maximum of ¼ in. in thickness features Sknhard guide and die holes, improved stripping guide design. Selector chart for easy determination of maximum rectangular and square shapes that can be supplied on the various punch bodies is also covered.

8 LAPPING AND GRINDING COMPOUNDS—*Clover Manufacturing Co, Norwalk, Conn.* 16-page booklet contains general data on lapping and grinding with abrasive compounds. Basic rules and precautions, and some less common applications should suggest a variety of other uses of the lapping process. Fields covered include hand and machine lapping; accuracy of surfaces; selection of proper grade of Clover compound; standard grease-mixed, water-soluble, and special compounds; relative hardness of abrasives.

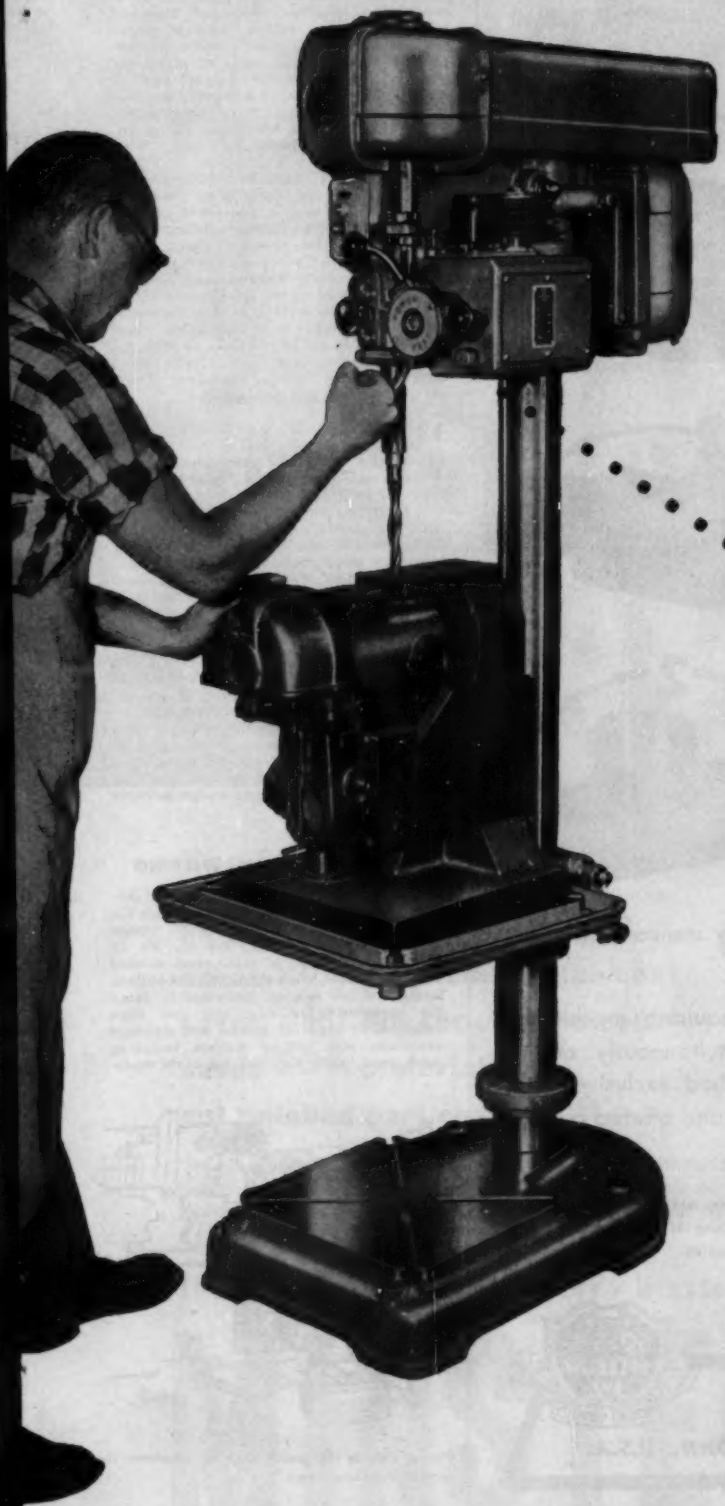
9 TIPS, TOOLS, TOOLHOLDERS, AND INSERTS—*Firth Sterling Inc, 3113 Forbes Ave, Pittsburgh 10, Pa.* 44-page catalog TTI-60 includes prices, specifications, and general information on all Firthite metal cutting products. Grade NTA described, a new general purpose steel cutting carbide with wide range of applications. Available in most of the company's tips, tools, and inserts, its features are indicated in a detailed performance chart.

10 AUTOMATIC ROLL FEEDS—*Durant Tool Supply Co, Providence, RI.* 6-page bulletin illustrates and describes single roll feeds with direct drive or overarm drive, and models with compound gearing. Series of double roll feeds also covered. Sizes, capacities, and prices included for all models.

"My mistake was telling my son how far I walked as a kid. Now he never worries about getting the car back to me."

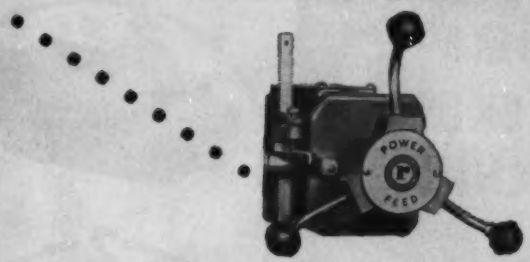
NEW: WALKER-TURNER

20" 'POWER FEED' DRILL PRESSES



combine up-front control with one-hand operation

Every model in this new W-T "Light-Heavyweight" line (and there are 16 of them to fit your needs) offers a revolutionary new mechanical power feed with performance features NEVER BEFORE AVAILABLE on a standard drill press. Now you can do continuous, heavy duty production drilling faster, easier and with greater accuracy.



For unequalled flexibility—front mounted pilot wheel is mechanically integrated with clutch control to provide easy one-hand engagement of power feed; drill point pressure is infinitely adjustable from 0 to maximum capacity of machine; furnishes power and thrust for drilling 1" diameter holes, yet adjusts for use with 1/16" bits.

For unmatched versatility—built-in control permits remote operation and can be electrically, hydraulically or mechanically interlocked with other units or synchronized with automation devices. Operator can utilize four feed ratios, drill manually, mechanically or in combination.

See your Walker-Turner Distributor (under "TOOLS" or "MACHINE TOOLS" in the Yellow Pages) for a demonstration. The only way to really appreciate the many outstanding features of these new W-T 20" 'Power Feed' Drill Presses is to see them *in action.* For FREE brochure giving specifications and information on how to adapt your present W-T 20" drill presses to 'Power Feed', write: Rockwell Manufacturing Company, Walker-Turner Division, Dept. WH21 400 N. Lexington Ave., Pittsburgh 8, Pa. In Canada: Rockwell Manufacturing Company of Canada, Ltd., Guelph, Ontario.

WALKER-TURNER
"LIGHT-HEAVYWEIGHT" MACHINE TOOLS
another fine product by
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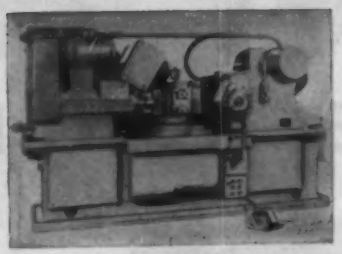
Here's what is meant by "1·2·3" in the GOSS & DeLEEUW AUTOMATIC CHUCKING MACHINE



The outstanding advantage of this machine is ability to handle operations on one, two or three ends of a piece *simultaneously or in sequence, without changing set-up or handling.* It is the only standard machine that will do this.

"1-2-3" means ability to handle work requiring machining operations on one, two or three ends simultaneously or in sequence—a method exclusive with Goss & DeLeeuw and offered on this machine.

For complete details ask for illustrated bulletin. Send samples of your work for time and cost estimates.

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11 SOLID FILM LUBRICANT—*Hohman Plating & Mfg Co, 814 Vermont Ave, Dayton 4, Ohio.* 2-page bulletin SL-126 provides data on Surf-Kote A-1290, a molybdenum disulfide compound designed to prevent galling, seizing, fretting, corrosion, cold welding, and similar friction problems over a wide range of pressures, temperatures, and surface speeds. Applied by spraying, dipping, or brushing, the material will air-dry in 15 to 20 minutes, eliminating need for high-temp curing required by similar lubricants.

12 GAGES, THERMOMETERS—*United States Gauge, Division of American Machine & Metals Inc, Sellersville, Pa.* 6-page bulletin 3020 contains information on bourdon-tube type pressure gages, illustrates 10 types, gives dimensions, accuracies, construction features, and suggested uses. Included under temperature measurement are dial and glass tube thermometers, panel type and multi-angle thermometers. Control instruments covered include indicating controllers, valve positioner and pilot options, recorders, chemical attachments and accessories.

13 PRODUCTION RATE RECORDER —*R B Annis Co, 1101 N Delaware, Indianapolis 2, Ind.* Illustrated bulletin PRR-60 contains description of portable instrument for analyzing the production rate of key automatic machines. It plots by strip chart a complete log of production rate information for any machine, automatically integrates production data and constantly compares actual rate with predetermined standard reference rate. Deviations from standard are shown in percentage on the chart.

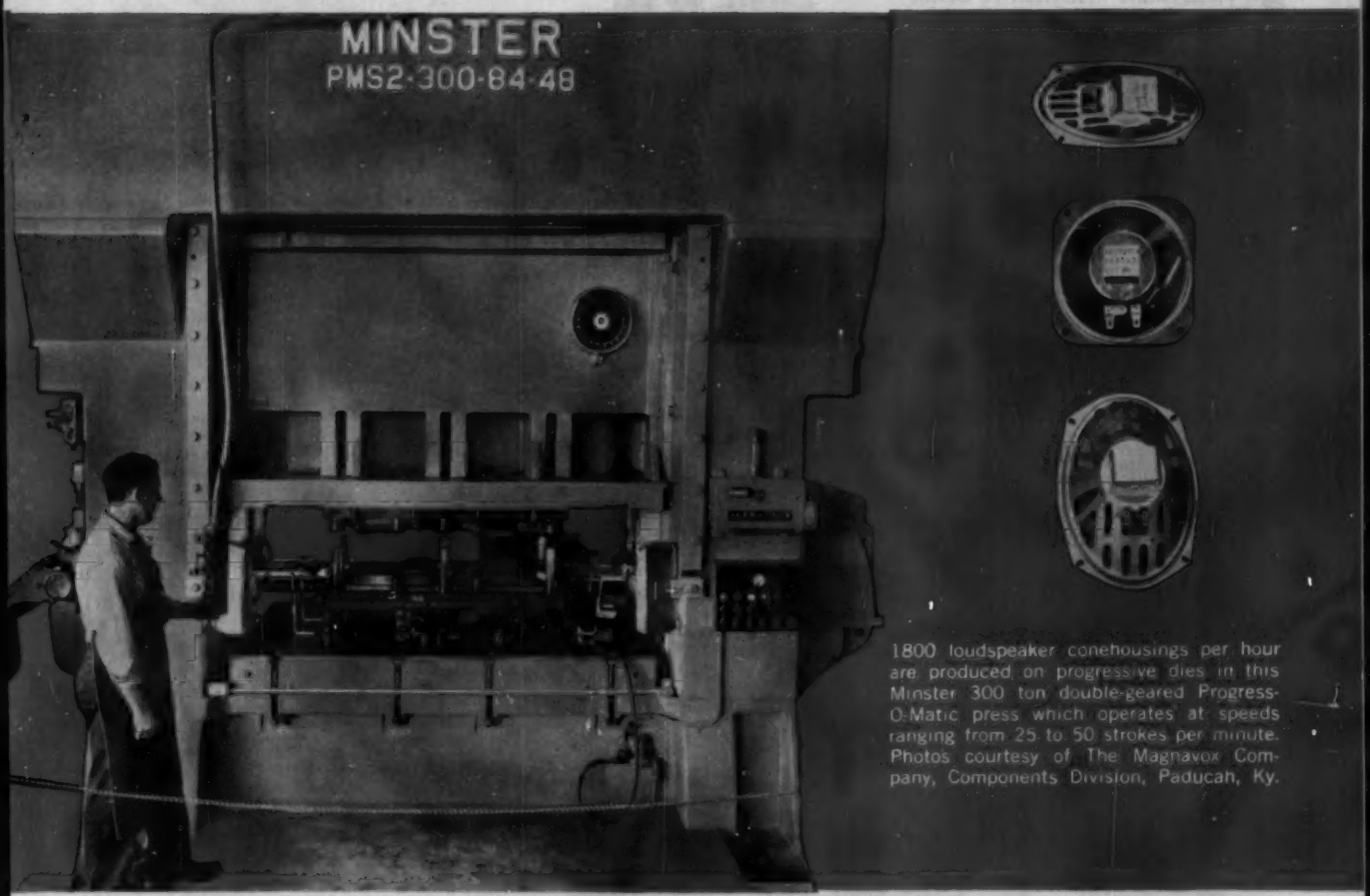
14 TWO-JAW INDEXING CHUCKS — *Cushman Chuck Co, Hartford 2, Conn.* 6-page bulletin 800 pictures and describes company's power and manually operated units that facilitate multiple precision machining operations on complex shaped parts such as gate and globe valve bodies and bottle molds in one chucking operation. Applications and design features illustrated.

HEAT TREATING AND WELDING

15 COIL JOINING WELDERS — *National Electric Welding Machines Co, 1846 Trumbull St, Bay City, Mich.* 6-page catalog (Welding News, Vol 12, No 1) discusses advantages of mash seam welding as a high-speed, high-strength, low-buildup method of coil joining. Describes in detail the engineering specifications and work range of 11 types of special and standard automatic coil joining welders including mash seam, spot, arc, and lap seam equip-

"Well, this is the worst case of whatever this is that I've ever seen."

AUTOMATIC PRODUCTION reduces costs...savings pay for the press



1800 loudspeaker conehousings per hour are produced on progressive dies in this Minster 300 ton double-geared Progress-O-Matic press which operates at speeds ranging from 25 to 50 strokes per minute. Photos courtesy of The Magnavox Company, Components Division, Paducah, Ky.

For Magnavox . . . this MINSTER Progress-O-Matic Press

saves 600% direct labor cost
saves 90% die maintenance cost
saves 75% die set-up time cost
saves 25% material cost
cut finished part cost by 50%

The interesting story on how Magnavox engineers achieved this outstanding cost reduction is contained in a reprint of an article which recently appeared in a leading magazine. May we send you a copy? Write to:

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Available as
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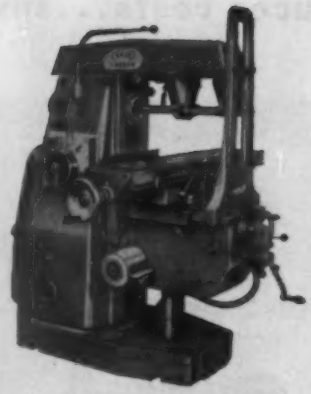

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table size: 52" x 11"
7½ and 1½ HP motors,
rapid power traverse.

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ment. Also contains useful data on automated units performing shearing, welding, and cold rolling operations for users considering joining equipment on anneal, coating, inspection, slitting, and strapping lines.

16 SPOT WELDING OF HARDENABLE STEELS — *Taylor Winfield Corp, 1043 Mahoning Ave, Warren, Ohio.* 8-page bulletin SP-6A describes equipment and procedures recommended for spot welding hardenable steels. Weld quality is classified and data charts summarize the welding schedules used on various steels. A number of steels to which spot welding technique can be adapted are listed; step-by-step instructions are included for setup, welding, and testing.

17 INDUSTRIAL ELECTRIC HEATERS — *General Electric Co, Schenectady 5, NY.* Revised 48-page catalog GEC-1005K lists product and application data for GE Calrod Tubular, finned tubular, cartridge, strip, insertion, and vane heaters; forced and natural convection air heaters; and Form G and edgewound overheaters. In addition, there are sections on heater control and wiring diagrams. Photos and dimensional drawings are shown for almost all types of heaters.

18 ELECTRODE SELECTOR—*Ampco Metal Inc, Box 2004, Milwaukee 1, Wis.* Pocket slide chart selects the proper electrodes for joining many commonly welded ferrous and non-ferrous alloys. Correct top and bottom electrodes are indicated for more than 160 combinations of alloys. Chart also includes data for determining the proper spot welding and seam welding schedules for various thicknesses of low carbon steel with a conversion table for other alloys. Accurate heat balance instructions included.

19 WELDING POWER SUPPLIES — *Hughes Aircraft Co, Vacuum Tube Products Div, 2020 Short St, Oceanside, Calif.* Literature available on new power supplies and accessories designed especially for miniature welding applications provides data on the VTW-1, a 5 kva half-cycle spot and seam ac welding power supply with weld speeds up to 20 a second; the VTW-14 inert gas shielded arc welding control, an extremely stable, fully adjustable, low current dc supply with automatic or manual rf arc starting.

"We don't want a machine that can do everything . . . we prefer to remain a highly specialized business!"

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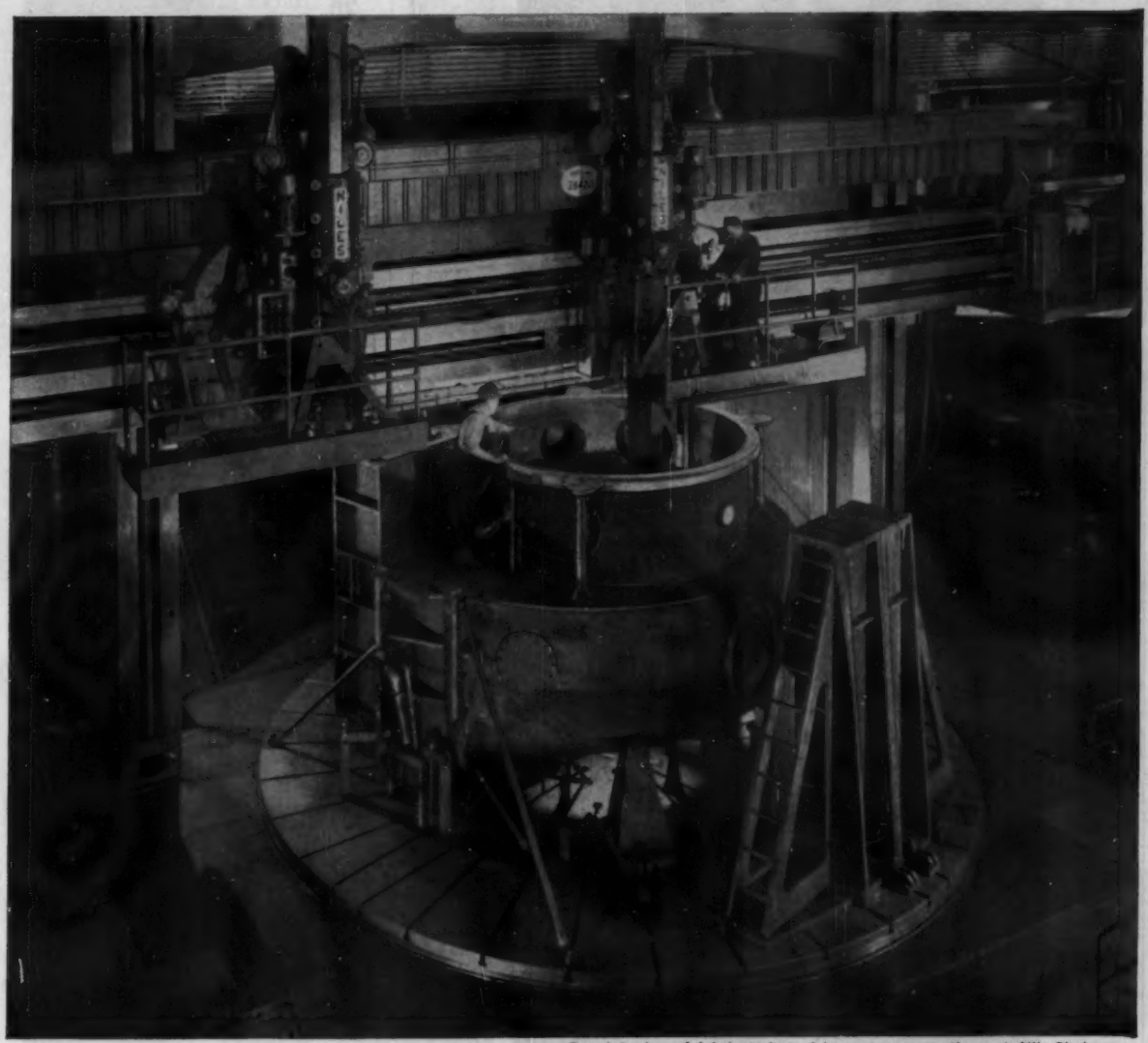

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Nobody understands the requirements of equipment for the metalworking industry better than people who are in it. As one of the world's largest metal fabricating companies, Allis-Chalmers sees first-hand how its own motors, control, pumps, and induction heaters perform under the severe everyday conditions of heavy usage, abrasive atmosphere and heat.

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A-C products for the metalworking industry: Centrifugal and Vacuum Pumps, Compressors, Motors, Control, Valves, Induction Heaters, Rectifiers, Transformers, Switchgear, Unit Substations, Water Conditioning Systems, plus Material Handling Equipment.

A-1320

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20 SILVER ALLOY BRAZING—*Handy & Harman, Training Division, 82 Fulton St, New York 38, NY.* 8-page bulletin gives details on the packaged self-study silver brazing training course based on the monthly 3-day brazing class in which the company has trained 2500 industrial brazers during the past 13 years. Lists and illustrates complete contents which includes easy-to-follow textbook and all materials required to complete the course exercises.

21 RESISTANCE WELDING TRANSFORMERS—*Kirkhof Manufacturing Corp, 2450 Buchanan Ave SW, Grand Rapids 7, Mich.* 8-page bulletin T60-1 describes complete line of Epoxy-Pak transformers, gives capacities and dimensions for each of the 9 basic units. With these epoxy impregnated and encapsulated units a heat rise of 110 C is reported to be completely safe and practical for high-production operation.

22 INDUSTRIAL FURNACES—*L & L Manufacturing Co, 136 Eighth St, Upland, Pa.* Illustrated catalog describes line of Dyna-Trol furnaces and ovens with specifications and prices. Range of sizes listed from front loading bench and floor models to top loading units. Units feature a variety of temperature ranges from 300 to 2300 F; with optional forced convection fans installed, temperatures of 150 to 1875 can be maintained.

23 ELECTRICAL CALCULATIONS FOR RESISTANCE WELDERS — *Taylor Winfield Corp, 1048 Mahoning Ave, Warren, Ohio.* 8-page brochure SP-8A contains tables which simplify calculation of the electrical power supply required by resistance welders. Factors of electrical demand and duty cycle are tabulated to establish minimum welder transformer kva ratings in accordance with RWMA standards. Maximum safe rate of operation of a welder can be readily determined by use of these tables which establish the maximum electrical duty cycle of a transformer under various demand loads.

PLANT SERVICE EQUIPMENT

24 PLATING BARRELS—*Hanson-Van Winkle-Munning Co, Church St, Matawan, NJ.* Bulletin PB-111 consists of nine new plating barrel and accessory equipment bulletins contained in a folder. These describe and picture the following equipment: Mercil-type portable barrels; special barrel equipment, Mercil-type hanger equipment; hanger-mounted motor drive equipment; cylinder materials and construction;

"You feel that some of the machines should be retired, is that it?"

Typical cavities produced by Mohawk Standard, two-diameter Sublands of the Drill-Drill type.

problem:

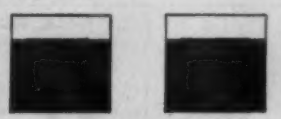
Having tap drill or body clearance problems with bolts and screws? Simply eliminate the problem, stop tap breakage, speed production and reduce tool inventories the easy way. Here's the . . .

solution:

MOHAWK STANDARD SUBLAND DRILLS

Mohawk Standard Sublands of the Drill-Drill type will produce clean, concentric, burrless holes in *one* simple operation. Thus, you automatically eliminate extra jigs, fixtures, tap breakage and poorly fitted parts. And, a Mohawk Standard will out-perform and outlast dozens of ordinary tools because they stay accurate through regrinds...right down to the shank! You get more holes per hour at lower cost per hole than ever before. Mohawk Standards are the time-proved solution for more efficient, cost-saving drilling operations.

MOHAWK STANDARDS are immediately available from factory and local stocks in three basic types: Subland Drill Chamfer, Subland Drill-Counterbore and Subland Drill-Drill. In all practical sizes, three standard step lengths and three shank styles.



Subland Drill-Chamfer | Subland Drill-Counterbore

Write Today **for your free copy of the new Mohawk Standard Catalog. Complete with detailed illustrations and specifications on the full line of cost-saving Standard Subland Drills.**

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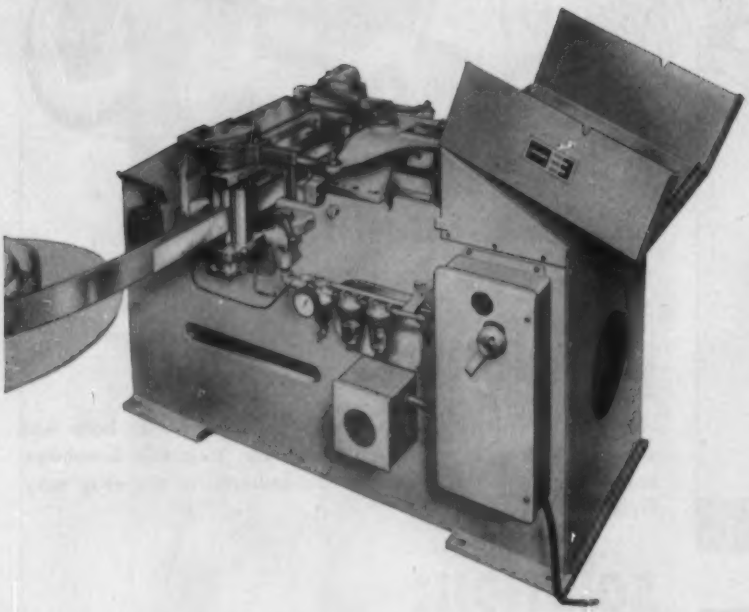

...you may not believe it!

At 1500 strokes a minute — maybe better — this new Emhart press zips open a fresh, exciting page in metal fabrication. And in non-metallic fabricating, as well. We have the feed to go with this super-speed, too, plus the experience to help you realize the full potential of this press. The dramatic — and believable — details are yours for the asking.
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plating barrel contacts; tank and drive equipment and tank transfer equipment. A final bulletin gives complete specifications for all standard model barrel units and all Mercil-type model MH barrel units.

25 PORTABLE SPACE HEATER — *Stow Manufacturing Co, 22 Shear St, Binghamton, NY.* 4-page bulletin 6016 covers complete line of direct-fired oil-burning units. Specifications and selection data provided on five different sizes ranging from 100,000 Btu per hr to 1,000,000 Btu per hr. Illustrated applications include drying plaster and other materials, thawing out equipment, and providing temporary heat for any area not equipped with central heating.

26 "ABC OF PALLET HANDLING"— *Raymond Corp, 47-134 Madison St. Greene, NY.* Digest-size booklet describes pallets and their uses; illustrates different types; lists advantages of wood and metal pallets; explains pallet specifications. Describes how to estimate pallet requirements by floor area, weight, and unit methods. Loading instructions given and standard loading patterns pictured.

27 SMALL PARTS HANDLING CONVEYORS—*Rapids-Standard Co, 342 Rapistan Bldg, Grand Rapids 2, Mich.* 8-page bulletin describes and illustrates construction features of cleated belt conveyors for general, light, and heavy-duty. Two magnetic conveyors are covered with applications pictured.

28 VIBRATION AND NOISE CONTROL—*Korfund Co, 29B Cantiague Rd, Westbury, LI, NY.* 8-page booklet K4G gives engineering specifications and performance data for 27 types of products for control and measurement of machinery vibration, shock, and noise. Installation photos show a variety of equipment and tell how typical problems were solved. Includes discussion of the relative merits of steel springs and organic materials as isolation media. Selector chart shows recommended and alternate methods of isolation, also indicates when concrete foundations are necessary.

29 PLANT HEATERS — *L J Wing Manufacturing Co, Linden, NJ.* 4-page illustrated bulletin MI-60 covers plant heating problems in the metalworking industry and solutions offered by overhead recirculating heaters, fresh air supply heaters, and door heaters. Discusses problems of proper warm air distribution in

"What's the matter with you? Ain't you got no sympathy for independent businessmen?"

ANOTHER TALIDE CASE HISTORY...

Talide®-TIPPED HAMMERS LAST 50 TIMES LONGER!

...at Pulverizing Machinery Division of AMERICAN-MARIETTA COMPANY

Pulverizing Machinery Division of American-Marietta Company, Summit, New Jersey, leading producer of pulverizers, dust collectors and air conveyors, reports *longer service life* and *improved machine operation* with Talide-tipped hammers.

Forged steel hammers tipped with super-hard TALIDE METAL wear strips ⅛ x ⅜ x 2½" pulverize 50 times more tonnage than possible with alloy steel hammers on all kinds of applications, including grain, tobacco, coal, ore, minerals, etc.

TALIDE METAL ... wear-proofs vital parts on machine tools, presses, pumps, compressors, and other types of processing equipment used in countless industries. METAL CARBIDES CORP., YOUNGSTOWN 12, OHIO

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"THIS LUBRICANT ENABLED US TO INCREASE PRODUCTION"

says—PITTSBURGH TUBE COMPANY

"Our 70,000 pound Draw Bench was designed to operate at a maximum of 80 feet per minute, full load. We decided to increase the drawing speed on lighter tubing to 100 and 104 feet per minute. This overloaded the Speed Reducer, however, causing it to overheat. We tried four different makes of oils without success before trying LUBRIPLATE A.P.G. 90. With LUBRIPLATE, we are able to pull heavier tubing than before at 104 feet per minute without the Reducer overheating."

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Maintenance Engineer

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE GREASE AND FLUID TYPE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE COSTS.

LUBRIPLATE is available in grease and fluid densities for every purpose . . . LUBRIPLATE H. D. S. MOTOR OIL meets today's exacting requirements for gasoline and diesel engines.

For nearest LUBRIPLATE distributor see Classified Telephone Directory. Send for free "LUBRIPLATE DATA BOOK" . . . a valuable treatise on lubrication. Write LUBRIPLATE DIVISION, Fiske Brothers Refining Co., Newark 5, N. J. or Toledo 5, Ohio.

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areas full of machinery or stocks of raw materials, replacement of air exhausted by fume removal system, and tempering of cold air inrush through shipping doors.

PARTS AND MATERIALS

30 SUPER WEDGE DRIVES—*Maurey Manufacturing Corp, Service Division, 2907 S Wabash Ave, Chicago 16, Ill.* 24-page catalog SW-1 explains in the first few pages how this drive reduces drive size as much as 50% and permits drive cost reductions as high as 20% with no loss in horsepower capacity. Primarily the book is a handy manual of engineering data essential to proper drive selection and installation. Selection tables, horsepower ratings, sheave dimension tables, and installation instructions covering belts, sheaves, and bushings included.

31 SOCKET HEAD CAP SCREWS — *Standard Fasteners Co, 2701 Washington Blvd, Bellwood, Ill.* Brochure provides latest information on new 1960 Series. In addition to explaining the many advantages of the new industry standards, it contains complete dimensional data on both the 1960 Series and the 1936 Series so that all users of socket cap screws can quickly ascertain differences when deciding whether to shift over to the new design immediately or at a later date. Separate thread length charts are provided with the brochure.

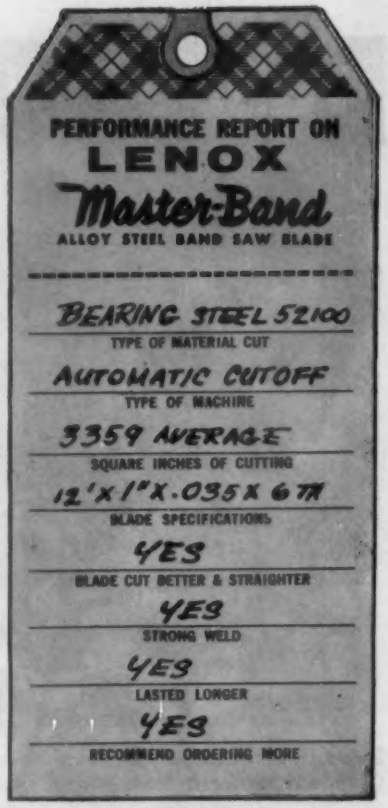
32 SUPER ALLOY TUBING—*Superior Tube Co, 1568 Germantown Ave, Norristown, Pa.* 16-page bulletin 71 on small diameter super alloy tubing for service up to 1650 F provides data on Type 316 stainless steel, A-286, Inconel X, Inconel 702, Hastelloy X, Hastelloy C, Haynes 25, and Waspaloy. Information included: materials and chemical composition; mechanical-physical properties table; alloys for high-temperature strength; heat treatment; short-time tensile properties at elevated temperatures; stress rupture data; tubing size limits.

33 VALVES—*Detroit Controls Division, 5900 Trumbull Ave, Detroit 8, Mich.* 20-page illustrated catalog 800-A condenses all information required to order D T Williams valves. Contains competitive cross reference charts and weight tables for comparative purposes and data covering a variety of pressure controls, temperature controls, solenoid valves and strainers.

34 TIMING BELT DRIVES — *T B Wood's Sons Co, Chambersburg, Pa.* 8-page bulletin 21103, "5 Simple Steps to the Selection of Timing Belt Drives," gives a method involving a minimum of mathematics for the selection of a drive to fit any application. Includes five sets of curves for drive-width selection; a standard timing belt catalog is the only outside reference needed.

35 BACK-UP RINGS—*Parker Seal Co, 10567 Jefferson Blvd, Culver City, Calif.* 12-page booklet of design, dimensions, and other data on Parbaks, Parker's continuous and contoured back-up rings describes characteristics and discusses advantages. Operating media data included.

36 POWDER METALLURGY PARTS—*Metal Powder Industries Federation, 60 E 42nd St, New York 17, NY.* Latest *Powder Metallurgy Quarterly* features case histories of electrical applications of powder metallurgy parts. Applications described illustrate parts used as conductors, solenoids, relay components, slip rings, shading coils, in iron, steel nickel-silver, bronze and copper. Also included in the publication is a description of methods of manufacture and typical applications for brass and nickel silver powders.



The Norma-Hoffmann Bearings Corporation of Stamford, Conn., reports that in trial-order tests the LENOX ALLOY STEEL MASTER-BAND saw blade cut more than 3000 square inches of steel on automatic equipment. As a result of these tests, the company, which manufactures precision ball, roller, and thrust bearings, will use the MASTER-BAND for its production cutoff work.

Users across the country report similar results on both standard and automatic machines.

Machines for which the MASTER-BAND is designed include Johnson, Laidlaw, Marvel, Kalamazoo, DoAll, Napier, Grob, Wells, W. F. Wells, Milband-Thompson, and Peerless.

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AMERICAN SAW & MFG. COMPANY
SPRINGFIELD 1, MASSACHUSETTS, U.S.A.

WE CLAIMED: OUTLASTS 3 REGULAR BANDS! BUT YOU PROVED: THE NEW LENOX MASTER-BAND OUTLASTS 4 OR MORE CARBON BLADES!

Users of band-saw blades are switching to the new LENOX ALLOY STEEL MASTER-BAND. A proven cost saver, the MASTER-BAND lasts longer than regular blades; enables you to cut many of the tougher steels on standard equipment. Performance reports from trial-order users across the nation prove that the MASTER-BAND, usable on both standard and automatic machines, is consistent, reliable, fatigue resistant, outlasting 4, or more carbon bands. Widths are ¼", ⅜", ½", ⅝", ¾", and 1".

Prove MASTER-BAND performance to yourself. For a trial order, send us blade specs, machine make and model, diameters of materials cut.

Reports from manufacturers of bearings and gears, machinery, and other metal products show that the MASTER-BAND is the answer for their specific applications.

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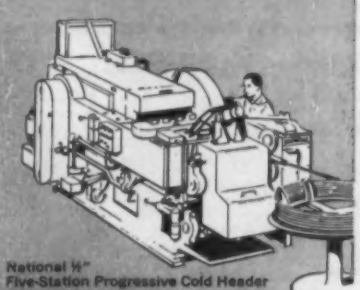
Still more parts from wire!

These important parts are cold-formed from wire, start to finish in compact, efficient National Cold Headers.

Practically scrapless, all these parts achieve remarkable savings over past methods.

If you make odd-shaped parts, may we help you evaluate them for cold-forming from wire? Better yet, come to Tiffin, witness our demonstrations and let's discuss your work.



National ½" Five-Station Progressive Cold Header

NATIONAL MACHINERY CO.

TIFFIN, OHIO, U.S.A.

HARTFORD DETROIT CHICAGO

NAMES IN THE NEWS

Budd Co has appointed **Thomas J Ault** president of the **Automotive Division**, Detroit. Prior to joining Budd, Mr Ault served as president of Saco-Lowell Shops, Boston

Michigan **Abrasive Co**, Detroit, has named **R J Foresman** a vice president. Mr Foresman was vice president of Midwest Abrasive Co for many years and most recently has been serving as vice president, sales, of American Lincoln Corp

Burroughs Corp, Detroit, has appointed **Walter Hanstein Jr** associate director of engineering. Previously manager of the machines research department at Burroughs' Paoli, Pa, research center, he will now be responsible for engineering coordination of all general products made by the company.

Studebaker-Packard Corp, South Bend, Ind, has elected **Clarence Francis** board chairman and named him chief executive officer of the organization. Mr Francis was formerly chairman of General Foods Corp and has been a Studebaker director since 1958. **Harold E Churchill** will continue as S-P president.

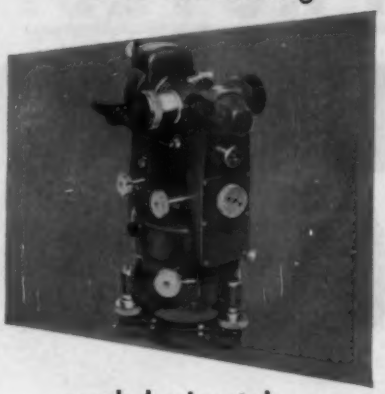
Thomson Electric Welder Co, Lynn, Mass, has named **C Dana Moore** sales manager.

(Continued on p 215)

to set up and align missile platforms nuclear equipment heavy precision machinery . . .

MICROPTIC THEODOLITE

auto-collimating



reads horizontal and vertical angles direct to 1 second of arc . . .

Convenient, portable, accurate, the Microptic Theodolite is an exact survey-type instrument with horizontal and vertical rotation for checking planes and measuring angles. It is the universal optical tooling instrument for setting up machine tools, radar antennas, atomic reactors, missile and ground support.

. . . *New*

Projection and displacement measuring accessories for fully universal use.

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DIVISION OF ENGINEERING AND SCIENTIFIC INSTRUMENTATION

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CIRCLE 294 READER SERVICE CARD

CIRCLE 295 READER SERVICE CARD

BUNTING® BEARINGS

Bringing the **most modern bearings** to the small lot and occasional buyer

Today your local Bunting Distributor can give you all the advantages of the most advanced bearing metallurgy. Available instantly from distributor stocks are finished bearings and bars made of Bunting Cast Bronze and Sintered Bronze, and Bunting Bearing Aluminum Bars.

The many hundreds of stock sizes of Bunting finished bearings and bars in these most modern metals meet practically every mechanical and cost requirement for machinery production and maintenance.

MACHINE SHOP SERVICE: Small lots of special design bearings, not obtainable from stock, can be procured immediately from fully equipped machine shops in Bunting branches. The wide range of sizes of Bunting Stock Cast Bronze and Sintered Bronze Bearings makes the alteration of a stock item to a special bearing easy and economical. Bunting Cast and Sintered Bronze and Bunting Bearing Aluminum Bars provide the materials for special sizes which cannot be made from stock bearings. Your local Bunting Distributor can arrange for such work.

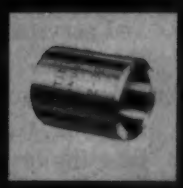
Case in Point

Bunting Bearings available from stock provide without further finishing a bearing suitable for practically any usual application, and in dimensions ranging from 3/16" ID x 5/16" OD x 1/2" long to 5" x 6" x 9".

1. Typical Cast Bronze Stock Bearing

2. Sintered Bronze Stock Flange Bearing

3. Sintered Bronze Stock Thrust Bearing



4. Sintered Bronze Stock Plain Bearing

Ask for Catalogs:

No. 158—Complete listing of sizes of Bunting Cast Bronze and Sintered Bronze Bearings and Bars, and Bunting Bearing Aluminum Bars. Pocket size edition.

No. 258—Complete listing of Cast Bronze Electric Motor Bearings for all makes and sizes of electric motors.

No. 46—Technology of Bunting Bearing Aluminum. A technical treatise on the composition, machining and use of this new bearing metal. Ask your local Bunting Distributor.

THE BUNTING Brass and Bronze Company · Toledo 1, Ohio · Branches in Principal Cities

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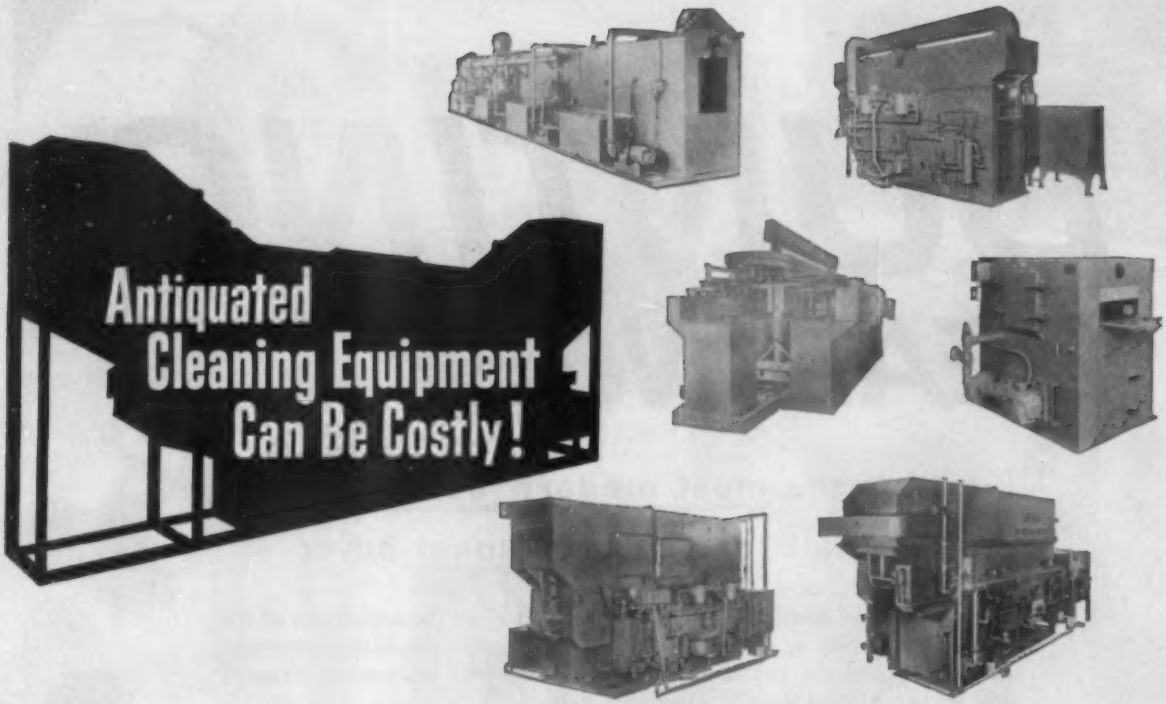

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It is no accident that the Detrex nameplate is found on more cleaning equipment in more metal-working plants than any other—*by a wide margin.* Detrex has had more than 30 years' experience in designing this equipment—has the most complete and modern facilities for producing it—has the largest and most expert field force to help install and service it. And now you can lease any of your cleaning equipment requirements from Detrex. Whether you need a machine for degreasing, washing, rustproofing, phosphate coating, paint-bonding or paint stripping—whether you require equipment that is large or small—whether you desire a manual or automated operation—Detrex can supply your needs exactly and follow through with the service that means complete satisfaction.

Depend on DETREX for Every Metal Cleaning and Processing Need

- PERM-A-CLOR NA (Trichlorethylene)
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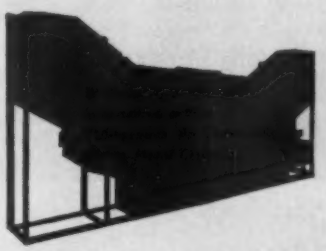
- Ultrasonic Equipment
- Industrial Washers
- Phosphate Coating Compounds
- PAINTBOND Compounds
- Aluminum Treating Compounds
- Alkali and Emulsion Cleaners
- Rustproofing Materials
- Extrusion and Drawing Compounds
- Spray Booth Compounds



DETREX CHEMICAL INDUSTRIES, INC.
Box 501, Dept. AM-1060, Detroit 32, Mich.

World's Largest Exclusive Producer of Cleaning Chemicals and Equipment

Reed Roller Bit Co has named **Robert L Walker** manager of the **Cleco Division** in Houston, Texas. Prior to his appointment Mr Walker served as coordinator of engineering operations with sales

Quaker State Metals Co, Lancaster, Pa, has appointed **Hilliard Y Smuck** chief executive officer and general manager and **Thomas M Zimmerman** executive vice president. Mr Smuck was formerly vice president and general sales manager and Mr Zimmerman was vice president, manufacturing.

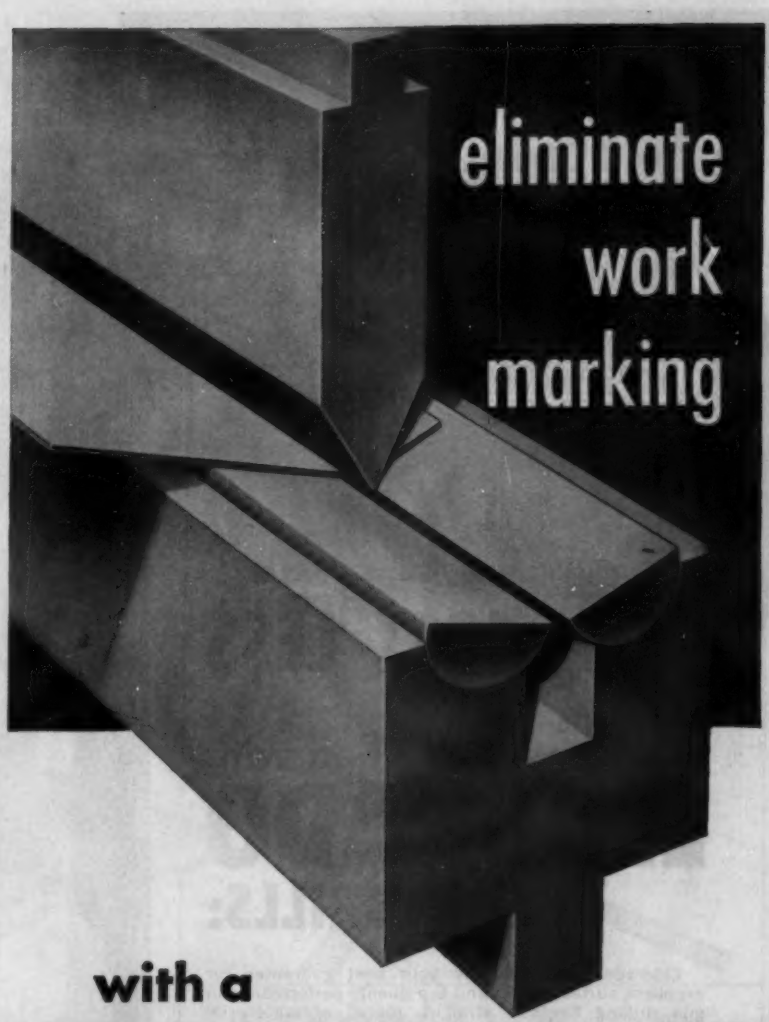
Allis-Chalmers Manufacturing Co has named **R C Allen** senior engineering consultant and **L J Linde** director of Engineering Services in the A-C Industries Group.

US Testing Co, Hoboken, NJ, has named **Richard L Hopkins** manager of the development engineering department. Prior to joining the company he headed his own consulting engineering firm.

Ferro Powdered Metals Inc, Salem, Ind, has appointed **Horace Frommelt** director of manufacturing research. Mr Frommelt has been director of the Spring Garden Institute-Metal Removal Center in Philadelphia, and has headed many projects with Ferro.

J Bishop & Co Platinum Works, Malvern, Pa, has named **William C Stewart** manager of the Mechanical Division. He was formerly senior staff industrial engineer with SKF Industries Inc, Philadelphia.

Cooper-Bessemer Corp, Mount Vernon, Ohio, has appointed **M J Helmich** chief engineer of the development division. Formerly assistant chief development engineer, he will fill the post of **W R Crooks** who has retired.



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Workmarking from forming sheet materials in press brakes and punch presses is greatly reduced and in many metals completely eliminated when formed with the Di-Acro Rol-Form Die. Hardened and precision ground rolls pivot smoothly in the die block to fold material without strain. You save costs by discarding elaborate and time consuming preparation and work methods, reducing polishing time, eliminating scrap parts. You also cut costs in press brakes and punch presses by reducing the number of dies needed and reducing set-up time.

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The Rol-Form Die is offered in five styles and in lengths from 6 inches to 12 feet for use in all sizes and models of press brakes and punch presses.

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NAMES IN THE NEWS

Titeflex Inc, Springfield, Mass, manufacturer of flexible hose and fluid couplings, has appointed **Milton L Lundgren** industrial sales manager. He was formerly vice president and general manager of Vulcan Radiator Co, Hartford, Conn.

Packard Bell Computer Corp, Los Angeles, a division of Packard Bell Electronics, has appointed **Vincent Neisius** to the newly created post of national computer sales manager. He will direct sales and service activities for the firm's new general purpose digital computer, the Model PB250. Mr Neisius was formerly administrative vice president of Systematics Inc.

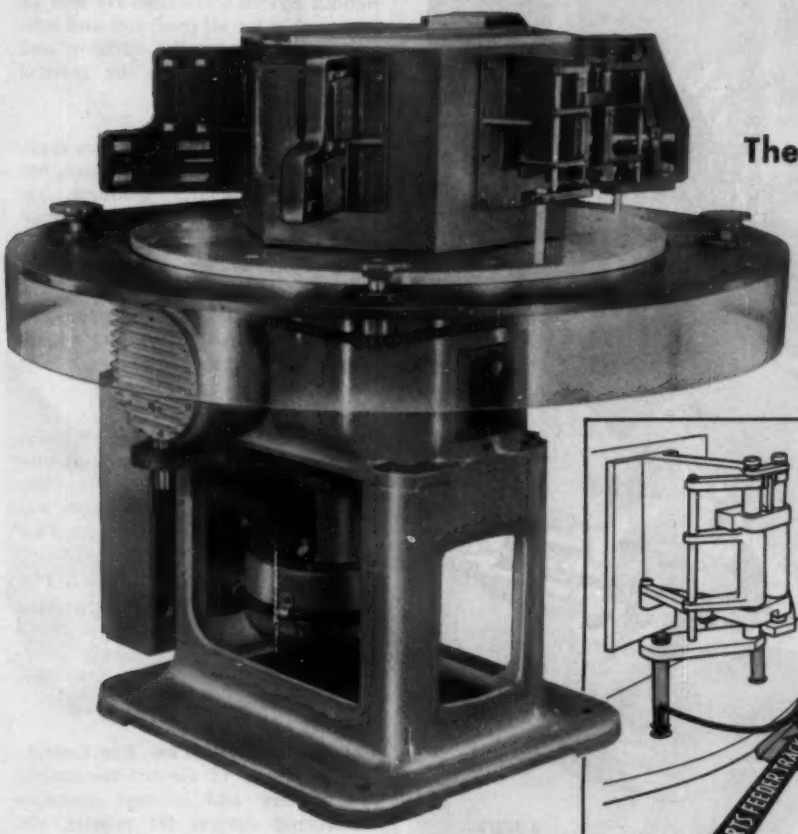
BMW Manufacturing Co, Torrance, Calif, industrial metal fabricator and tool manufacturer, has appointed **Roland Louis Guerin Jr** sales manager. Mr Guerin previously served as sales manager for the Clearing and Western Design Divisions of US Industries.

Federal Pacific Electronic Co, Newark, NJ, has appointed **C H Brittenham** manufacturing manager of its Pacific Manufacturing Division. He will be in charge of operations at Federal's new 250,000 sq-ft plant in Santa Clara, Calif. Prior to joining the organization Mr Brittenham was associated with the Square D Co as production control manager.

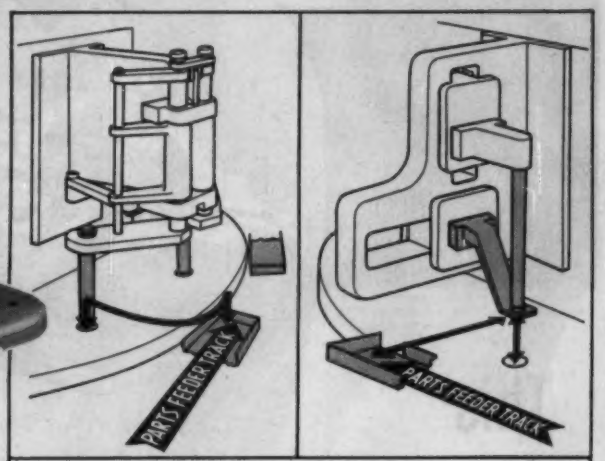
Summers Gyroscope Co, Santa Monica, Calif, has appointed **Edward H Heinemann** executive vice president. Mr Heinemann recently resigned as corporate vice president of Douglas Aircraft Co in charge of combat aircraft engineering, aircraft and missiles.

Yuba Consolidated Industries Inc, San Francisco, has named **Arthur H McElroy** vice president and general manager of the newly organized Yuba-Tulsa Corp, formed as a result of the acquisition of Coynco Products Inc. Mr McElroy was formerly general manager of Coynco. **Karl A Gardner,** in addition to his position as vice president, engineering, of Yuba Consolidated Industries, has assumed the title and duties of vice president and director of engineering of Yuba-Tulsa, **John Abbott,** formerly vice president, manufacturing, of the Graver Tank Co, East Chicago, Ind, has left that company to become vice president, manufacturing, of Yuba-Tulsa.

A NEW APPROACH to AUTOMATIC ASSEMBLY...



The machine tool concept to reduce equipment costs



Two of the standard cam actuated "pick & place" and "push & guide" stations. Each serves two dial positions. Shaded areas indicate those components attached by the user.

For the first time, medium size plants can employ automatic assembly to compete with large scale manufacturers because high volume is no longer a prerequisite to automatic production.

Ferguson's new approach to automatic assembly problems provides a standard rotary transfer machine complete with work stations that furnish parts placing motions right to the dial. The user only adds minor parts holding and positioning devices designed to conform to his production items. At the end of a production run *he changes set-up, as he would for any machine tool,* for operations on a different assembly.

Low initial cost of this standard machine means a fast pay-off on investment. Design versatility makes it adaptable for many uses and guards against obsolescence. And, as with any quality production machine tool, it is built for year-after-year performance with only normal maintenance practices.

SEND FOR CATALOG NO. 602— showing the many things we can do to help you improve automation techniques. Our engineers are ready to help you with any problem. They will start from scratch or redesign present equipment. Write us today.

Hicks Development Division

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SUPER TRUSTEE CONCRETE BLOCK MACHINE BUILT BY THE GENE OLSEN CORP., ADRIAN, MICHIGAN

This dependable hydraulic heart

The heart of this 1100 blocks per hour concrete block machine is a
RACINE
MODEL 8R PUMP

REDUCES UPKEEP AND DOWN-TIME BY AS MUCH AS 80%

"RACINE HYDRAULIC EQUIPMENT is the *heart* of our concrete block machines," says C. S. DeLamater, sales manager for The Gene Olsen Corp., another satisfied user of RACINE PUMPS and VALVES exclusively since 1949. Besides the tremendous savings in operating hydraulically-designed concrete block machinery, the firm emphasizes the advantage of simplified control of oil circulation in RACINE VARIABLE VOLUME PUMPS. They pump *only* the oil required to do the job — no waste of pressure oil — no heating. Thus through lower horsepower, operation economies are enjoyed.

RACINE
Racine Hydraulics & Machinery, Inc.
RACINE, WISCONSIN
HYDRAULICS DIVISION

NAMES IN THE NEWS

Bendix Corp has appointed **Donald G Speyer** director of contracts of the Bendix Systems division. He will be responsible for all contracts and subcontracts held by the division and will report directly to the general manager.

Sun Chemical Corp, New York manufacturer of chemicals, coatings, finishes, and specialty products, has elected **Eugene Jacobson** vice president. He formerly headed the Facile Corp which is now a Sun division.

Vickers Inc, Detroit, has promoted **Dr W Wai Chao** from chief of research to director of research and development.

Pentron Electronics Corp, Chicago, has appointed **Irving Brenholdt** vice president, engineering. Prior to joining the company Mr Brenholdt was chief electronics engineer at Farrand Optical Co, New York.

Vinco Corp, Detroit, has appointed **Allistair Dunn** executive vice president. Mr Dunn was formerly director of manufacturing for the Ohio Injector Co.

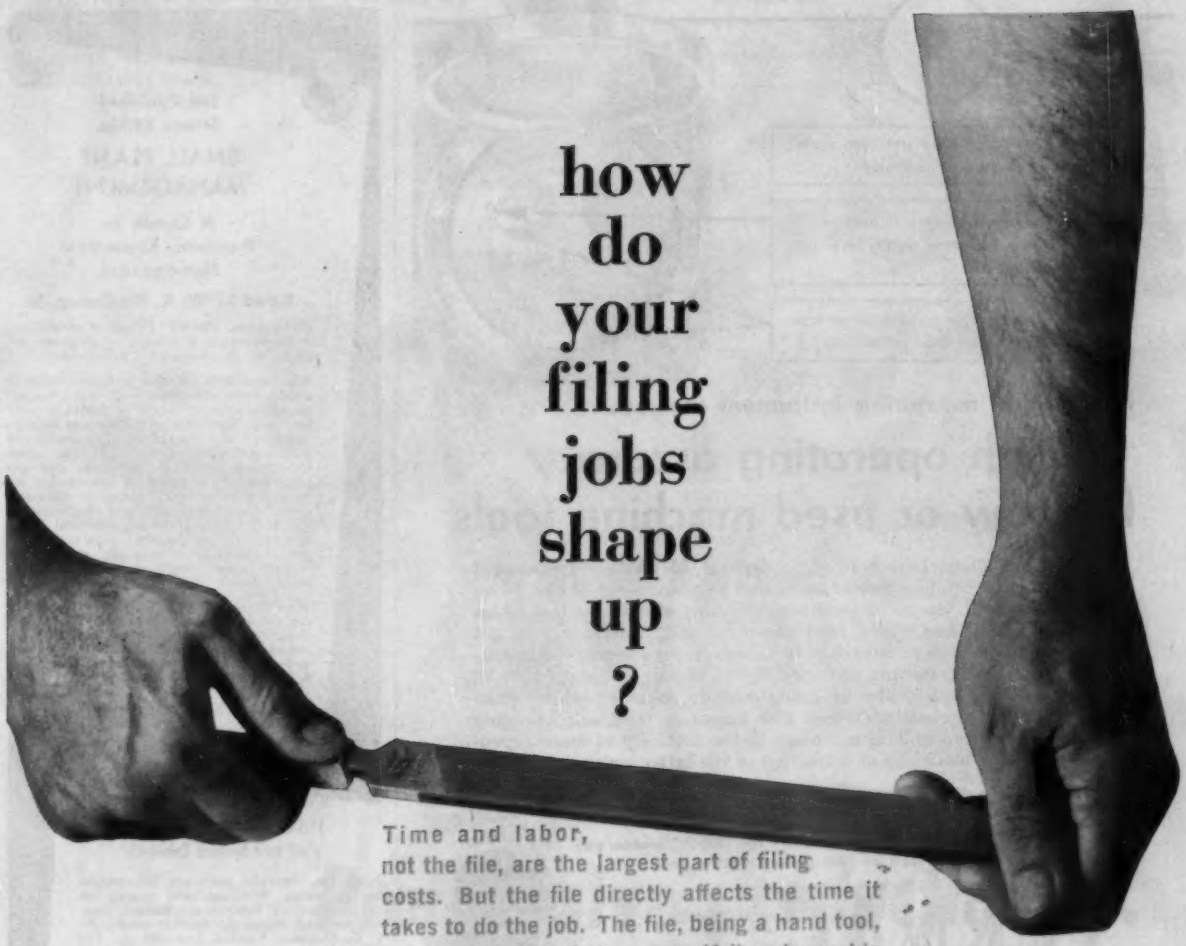
Colvin Laboratories Inc, East Orange, NJ, producer of electro-mechanical transducers and related pressure measuring devices for missile, aircraft, and industrial applications, has appointed **John A Felty** plant manager.

American Insulator Corp, custom plastics molder of New Freedom, Pa, has appointed **Donald N Kidd** to the newly created position of manager, sales engineering. Mr. Kidd has been associated with the organization for 27 years in production and sales capacities.

Food Machinery & Chemical Corp has promoted **Arthur F David** from plant superintendent of the John Bean Division, Lansing, Mich, to manufacturing manager. **Walter Follette** has been appointed purchasing agent and **Harold Groesbeck** assistant purchasing agent.

Milwaukee Crane Division of **Novo Industrial Corp,** Cudahy, Wis, has named **Edward A Puchalski** sales manager.

Anchor Adhesives Corp, Flushing, NY, has appointed **Irving Bederson** sales manager.



how do your filing jobs shape up ?

Time and labor, not the file, are the largest part of filing costs. But the file directly affects the time it takes to do the job. The file, being a hand tool, is an extension of the man. If it reduces his skill, the work suffers and costs go up. But if the file matches a worker's skill, he becomes more productive and therefore, costs go down. Nicholson and Black Diamond files are preferred by the majority of industrial purchasers. They're top quality to produce a quality job. They match a worker's skill. There are 6000 different types, shapes and sizes . . . one that's precisely right for your job. And they wear well, thereby reducing your tool replacement costs. Your Nicholson or Black Diamond Distributor* will be glad to help you with your filing problems, help select the right file for your job.

* Industrial Distributors provide the finest goods and services in the least possible time. Our products are sold exclusively through them.

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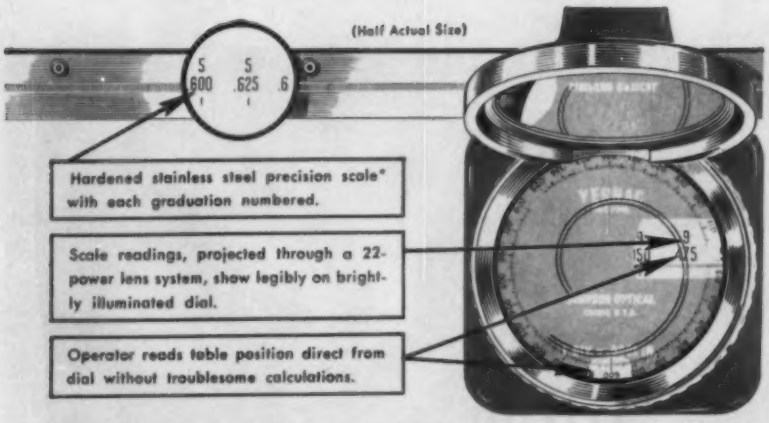
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high operating accuracy for new or used machine tools

The new VERNAC Direct Reading Optical Measuring Instrument eliminates the complexities of using end rods and gage blocks. Now, the longitudinal, lateral or vertical positioning of machine tool tables can be quickly and easily read direct to .0002". Accuracy is not affected by the wear or stretch of table movement screws. The instrument itself has no moving parts which can impair accuracy.

VERNAC instruments also up-grade machine tools to perform tasks beyond their original accuracy. For example, they can up-grade moderately priced milling machines to the accuracy of more expensive jig boring machines at a fraction of the latter's cost.

*The scale is a replica of a master certified by the U.S. National Bureau of Standards to .0001" maximum error over its entire length.

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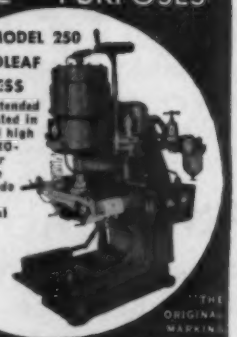

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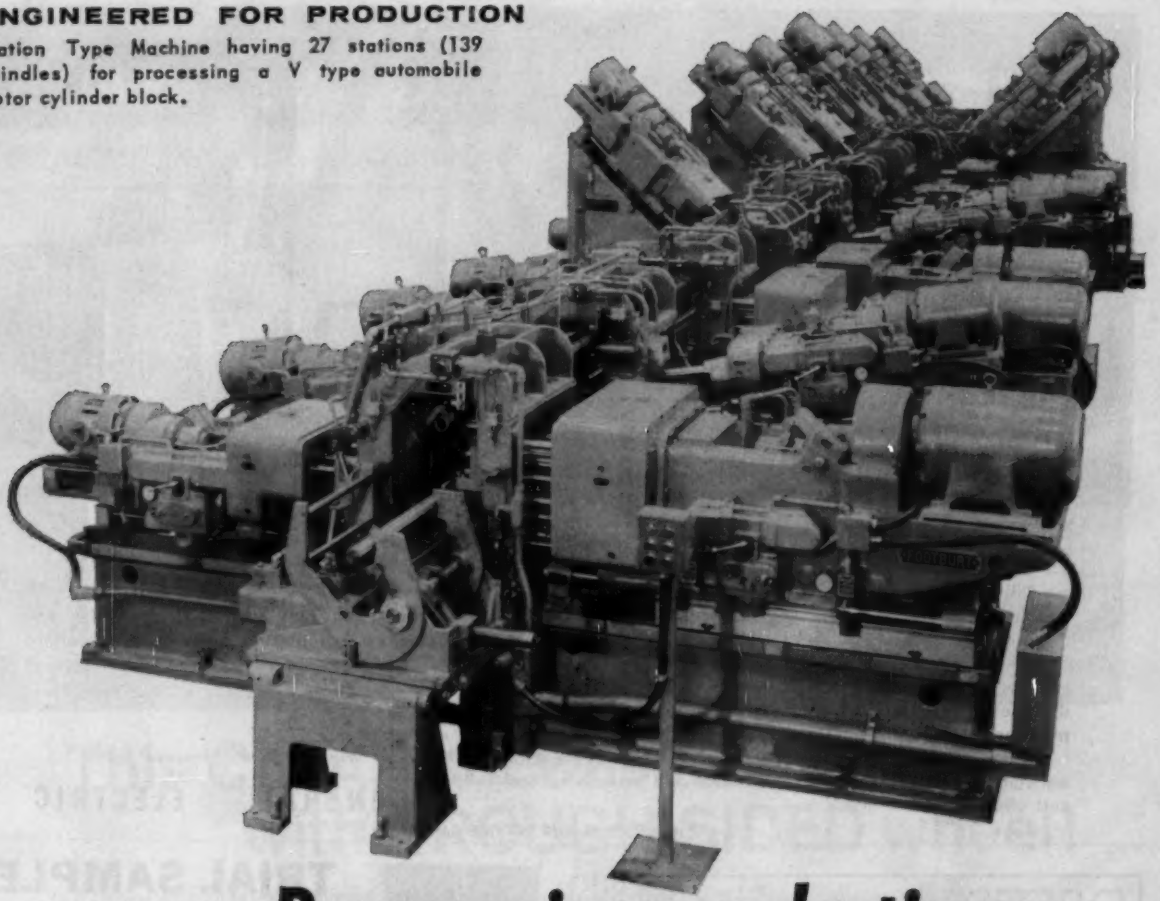

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With the Station Type Machine, Footburt continues to provide the most modern developments in production machinery.

Drilling, reaming, tapping, milling, checking and testing may be combined in one station type machine, and units may be mounted at any angle.

Installations of Footburt Station Type Machines have been made in many leading automotive plants, in some case handling the major machining on the block and head components.

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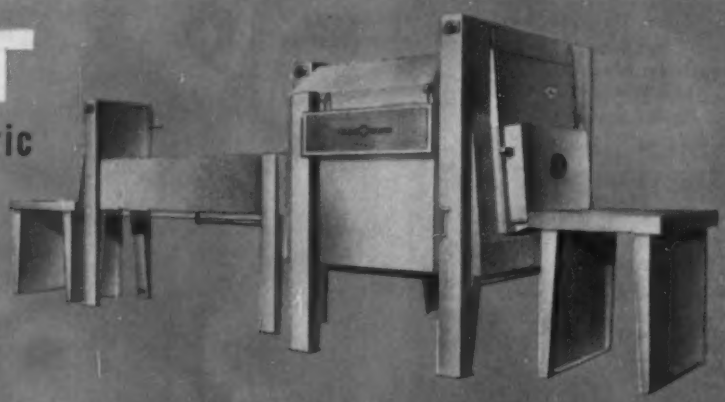
HEAT
from General Electric



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performs many joining jobs faster, better, more economically

For brazing and sintering operations, General Electric furnaces offer the greatest economy and versatility available. Replace costly hand operations, such as forging, welding, and riveting, and get better results—faster and more economically.

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General Electric also offers you unmatched application assistance in selecting the right furnace and process to best suit your particular needs.

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Ask your General Electric Sales Engineer to show you how you can save time and money by replacing costly hand operations with G-E Furnaces. Or write to General Electric Co., Schenectady 5, New York.

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Model No.	Tray Width	Tray Stroke	Power In	Power Out
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20-CT-59	10" to 36"	10" to 30"	Cable	AirCycle
30-RR-59	10" to 72"	12" to 30"	Rack	Rack
30-CT-59	10" to 72"	12" to 30"	Cable	AirCycle

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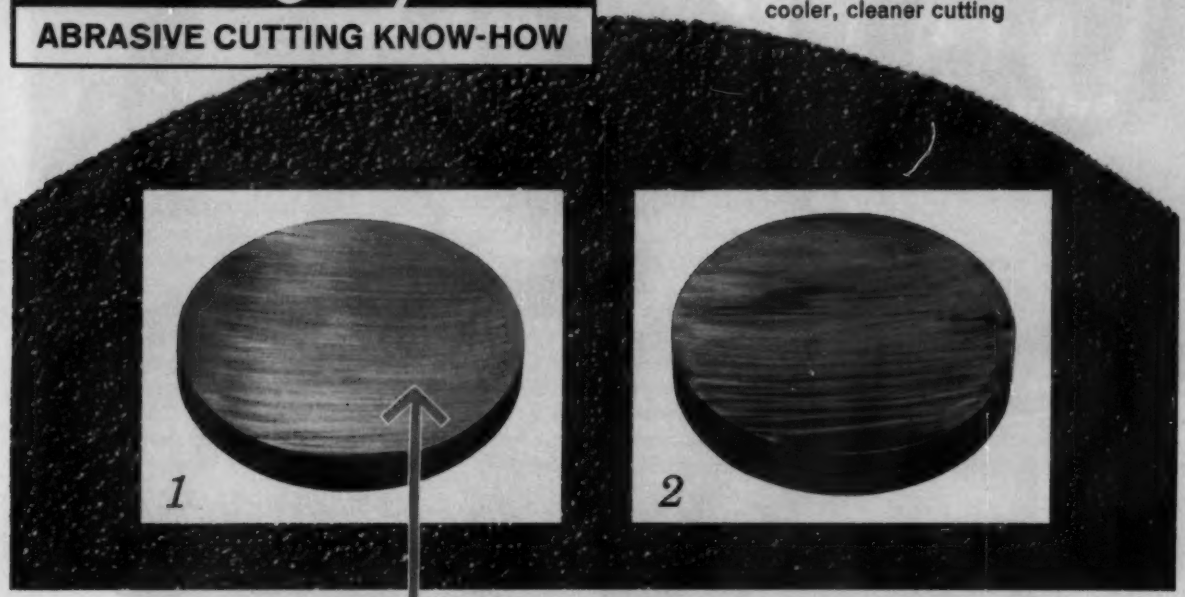
Allison-Campbell
ABRASIVE CUTTING KNOW-HOW



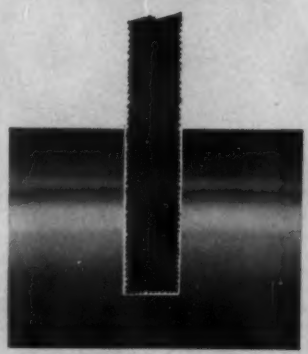
Close-up view of resinoid wheel shows rough texture that provides cooler, cleaner cutting

This CLEAN cut was made with a ROUGH-SIDED wheel!

1 • **THE SPECIMEN ON THE LEFT ABOVE** was cut from a 3¼" diameter hardened steel bar in just 28 seconds with an ALLISON *rough-sided* dry abrasive cutting wheel like the one shown in the background. Note that the cut is clean and practically burn-free.

2 • The specimen on the right was cut under the same conditions and with a wheel of the same formulation, but *without* rough sides. The result—the cut took 30 seconds and produced a badly burned surface.

3 • The secret is the extra clearance the rough sides give *inside* the cut (as shown in the small picture at right), and the resulting *cooler* cutting action. This adds to wheel life, too. That's why, for the dry abrasive cutting of solid bars, heavy-wall tubing and structural shapes, ALLISON-CAMPBELL field engineers generally recommend rough-sided wheels.



3 Inside the cut, rough-sided wheels give extra clearance, extra cooling for faster cutting and to prevent burning

For dry cutting of thin-wall tubing with minimum burr, a fine-grit, *smooth-sided* wheel is the choice. And for *wet* abrasive cutting, dozens of ALLISON wheel specifications are available to match the material you are cutting, the quality you require, and the cut-off machine you use.

Regardless of your cut-off problems, your ALLISON-CAMPBELL field engineer can help you choose the wheels that will give the results you want. He is an abrasive cutting specialist—use his know-how.

Write for **Bulletin DH-214A** *for details on the complete line of ALLISON wheels*

ACCO

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The No. 18-A2 Blanchard Surface Grinder ... a modern Two-Spindle Automatic that is accurate, fast and versatile!

This new Blanchard Grinder of advanced design offers you many important features, all adding up to better, faster surface grinding. The No. 18-A2 Blanchard is a versatile, rugged, hard-working machine. It is of a "dry base" design: in operation, all coolant and chips flow to an outside settling tank, separator, or central coolant system. Easy access is provided to the grinding wheel area, and push-button stations and operator's control are conveniently located for ease of set-up. All controls are interlocked, guaranteeing complete safety. Whenever grinding wheels require replacement, a warning light flashes at the operator's station. The No. 18-A2 Blanchard may be equipped with 30, 40 or 50 HP, foot-type spindle motors. This grinder can also be provided with 40" magnetic chuck or 43" plain table for special work holding fixtures.

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V-562

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and look what you get

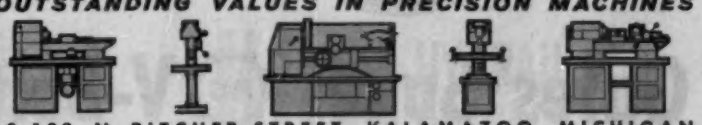
- **VERIFIED ACCURACY**—guaranteed by 16 precision tests documented for you in report accompanying each lathe.
- **FLAME HARDENED BED WAYS**—"accuracy protection" which costs many dollars more on other lathes.
- **BIG FORGED SPINDLE**—1⅜" bore, 1 1/16" collet capacity.
- **"ZERO PRECISION" TIMKEN SPINDLE BEARINGS.**
- **SHAVED GEARS**—another CLAUSING "exclusive" assuring greater accuracy and smoothness.
- **BIG CAPACITY**—No. 5418 (illustrated) has 12¾" swing, 23" between centers, 10-speed ball bearing countershaft. Takes up to 1½ HP motor, extra. *Also available with 35" and 48½" centers, and with variable speed drive, clutch and brake, L-00 spindle.*

These, and other features—plus low initial investment—make the Clausing the greatest value in lathe history! Write today for full information.

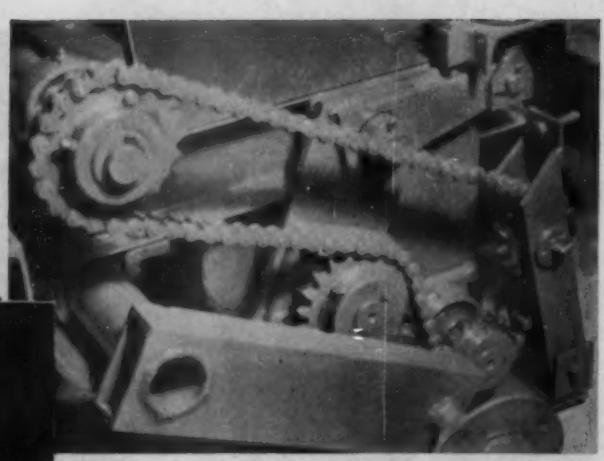
350

CLAUSING
DIVISION OF
ATLAS PRESS COMPANY

OUTSTANDING VALUES IN PRECISION MACHINES



10-102 N. PITCHER STREET, KALAMAZOO, MICHIGAN



FORMER DRIVE: The high speed operation of Gehl's Cure-All Hay Conditioner caused failure of the roller chain drive.

PRESENT DRIVE: Both the limited space and high speed requirements were met with this Gates Super HC V-Belt Drive.

Gehl Brothers Manufacturing Company Finds

Super HC V-Belt Drive handles speeds chain drive couldn't take!

Roller chain drives on Gehl's Cure-All Hay Conditioners **"would not stand up under the speed of operation." Yet conventional V-belts that would fit into the space available could not handle the working load for this outstanding line of forage harvesting equipment.**

The design problem remained a tough one until the introduction of the Gates Super HC High Capacity V-Belt early last year. Then the Gates Field Engineer, working closely with Gehl Engineers designed the new drive shown above.

"The Super HC V-Belt Drive has eliminated need for shear pins and clutches, has increased efficiency, and lowered maintenance costs," is the pleased report from Gehl personnel.

Take advantage of Super HC on your equipment

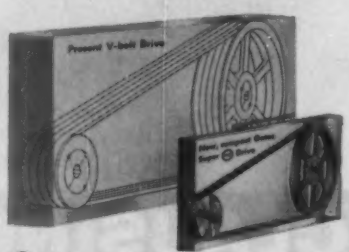
Whenever you have a drive change on a new model or are replacing belts or sheaves, let your Gates Representative show you how Super HC Drives can reduce sheave diameters 30% to 50%, drive space up to 50%, drive weight and cost as much as 20%.

A handbook, "The Modern Way to Design Multiple V-Belt Drives," is yours for the asking. Simply contact your Gates Representative listed in the Yellow Pages.

TPA 505

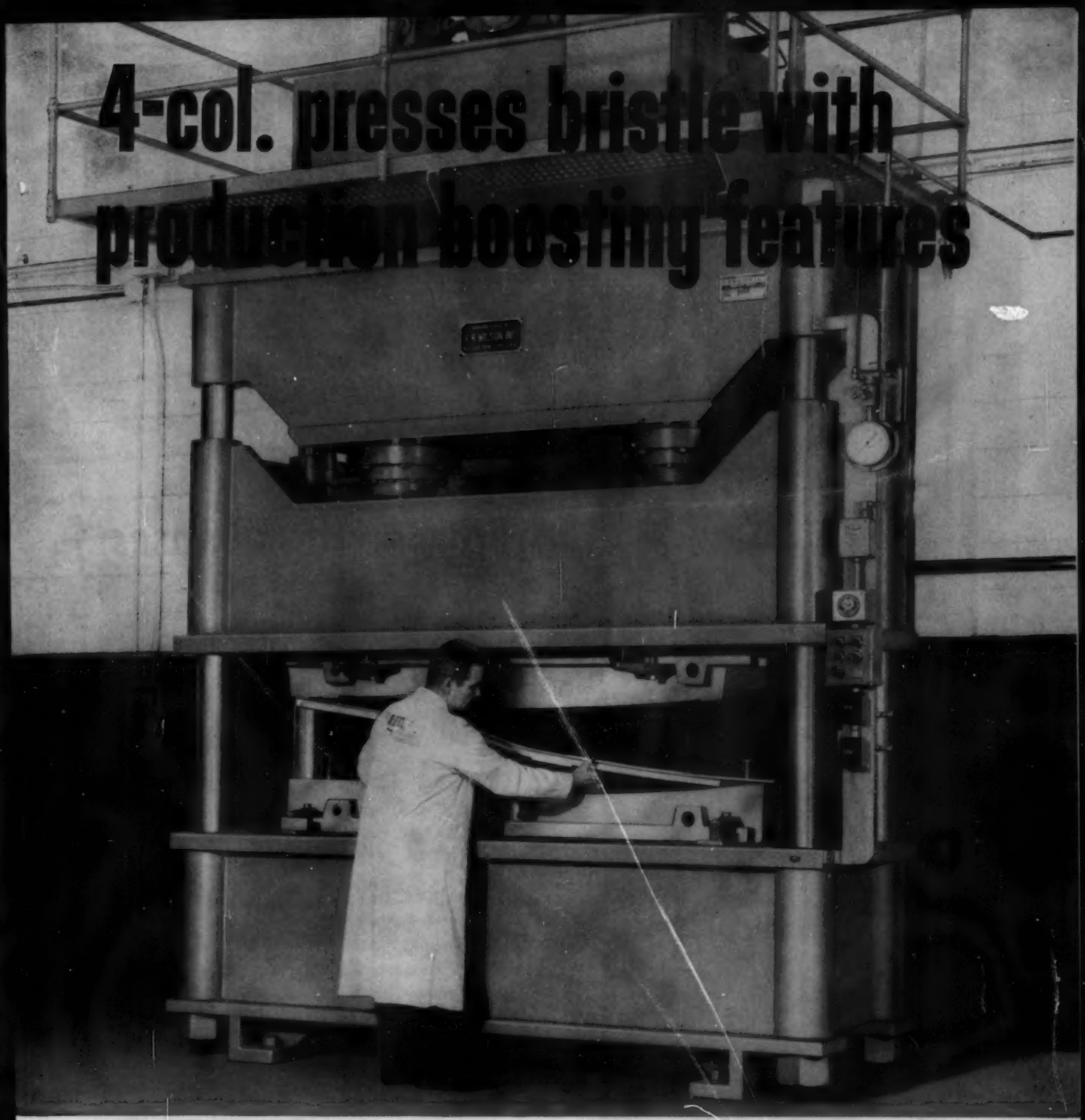
The Gates Rubber Company, Denver, Colorado
Gates Rubber of Canada Ltd., Brantford, Ontario

Gates *World's Largest Maker of V-Belts*



Gates Super HC V-Belt Drives same hp capacity in smaller "package"

4-col. presses bristle with production-boosting features



KRW has done it again! This time, the 25-1000 ton KRW line of 4-column, single action hydraulic presses has been modernized to set a new pace over a broad work range.

Bristling with newness, these smooth-acting machines are built to outperform even KRW's highly regarded, prior designs in a wide variety of assignments: Blanking, forming, punching, trimming, drawing, extruding, briquetting, straightening, pressure clamping, laminating and bonding.

Already acclaimed "a marked success," KRW's latest version of the 4-column press boasts numerous features to improve quality and increase productivity: Of rugged, welded steel construction, the crown, bed and sliding platen provide maximum resistance to deflection. Align-bored to automatically controlled tolerances, the sliding platen is guided on ground and polished columns which are closely fitted into the crown and bed.

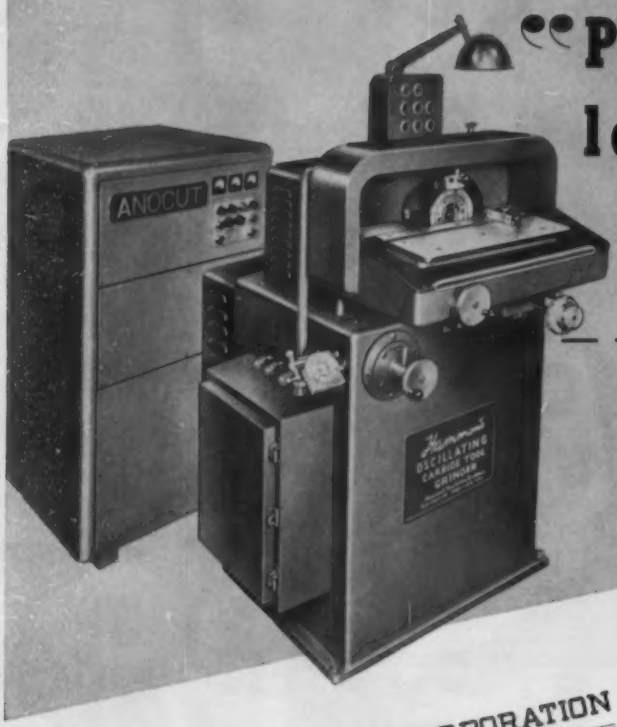
Easy to adjust, KRW hydraulic systems assure instant, complete press control. Compactly designed, the pumping unit can be mounted at the top of the press or furnished for floor installation.

Available with either up-acting or down-acting platens, KRW 4-Column Presses can be outfitted with manual lever or electric push buttons for single or continuous cycling.

For detailed information and specifications, write for Bulletin 95-D. K. R. Wilson, Inc., 21[illegible] Main St., Arcade, N. Y.

KRW HYDRAULIC PRESSES

CIRCLE 315 READER SERVICE CARD



"Paid for itself in less than a year

used only 4 to 5 hours per day"

Another user reports on

Hammond ELECTROLYTIC GRINDERS

THE COOPER-BESSEMER CORPORATION

MACHINERY BUILDERS SINCE THE YEAR 1833

ENGINES AND COMPRESSORS

MOUNT VERNON, OHIO

February 15, 1960

Hammond Machinery Builders, Inc.
1600 Douglas Avenue
Kalamazoo, Michigan

We are pleased to report that the Hammond Electrolytic Grinder we purchased in 1957, while only being used four to five hours per day, has paid for itself in less than a year.

Because of these results, we have recently purchased two more for other departments in Mount Vernon and one for our Grove City, Pennsylvania Plant.

We are getting not only a good quality tool grind job in the same length of time as before, but we have also reduced our diamond wheel consumption 80 to 90 per cent.

Yours very truly,

E. C. Phelps

E. C. Phelps,
Works Manager

Cost analysis verifies the substantial savings in carbide tool grinding these Hammond Electrolytic Grinders achieve in plant after plant. See for yourself. Send us a few single-point tools to be ground. They'll be returned promptly with a "processing and time required report." No obligation.

Hammond OF KALAMAZOO Good Machinery Since '82

Hammond Machinery Builders INC.

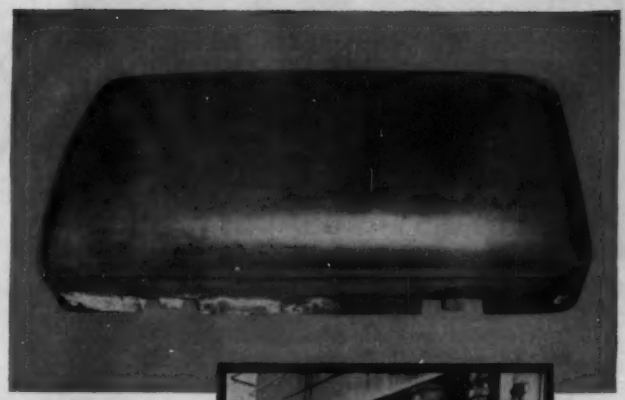
1618 DOUGLAS AVE • KALAMAZOO, MICHIGAN

377

SAVED 50%!

THIS PUNCH FACED WITH REN EPOXY RESINS

Built by Allied Products Corporation for stamping ambulance roofs, this punch is constructed of a zinc alloy core, faced with a ⅜" thickness of epoxy resin compound. The use of epoxy facing shortened tooling time—simplified the program—and reduced labor costs for an overall savings of 50%!



ON THIS TOGGLE PRESS

The punch is held in place by five large clamps on each side of this 13-ton toggle press. Stampings are drawn from 80" x 164" sheets of 18 gauge steel.

STAMPS THIS ROOF!

The roof stamping measures 68" wide, 158" long and 8" deep. Allied Products uses this epoxy tooling process to stamp approximately 4,000 roofs annually for the Miller-Meteor Company, Belfontaine, Ohio.

Reduce tooling costs at the start of the program—by selecting Ren epoxy resins for the tooling process. Engineers report programs simplified by 40%—time saved to 70%—and overall tooling costs reduced by 50%! Dependable epoxy formulations by Ren provide lasting dimensional stability, rugged compressive strength — plus scheduling flexibility that permits easier, quicker design modifications.

ren

PLASTICS, INCORPORATED

Lansing 9, Michigan

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Published periodically by Ren, these bulletins provide technical information and applications of plastic tooling. If you are not presently receiving your free copies, fill-in and mail this coupon.

Ren Plastics, Incorporated
5422 South Cedar Street,
Lansing 9, Michigan

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Position_____

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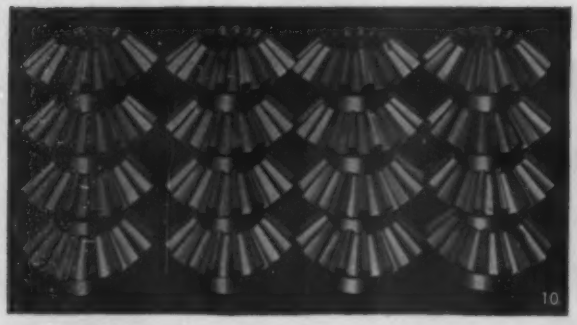


Pattern of PRECISION . . .

Accuracy in quantity is yours at Stahl Gear, as exemplified by these steel mitres scheduled for use in the steel industry. Specifications were met EXACTLY and PROMPTLY—13.931" O.D., 4" F., 1¼ D.P., deep case-hardened for long life. Stahl-built means precise fit and long, trouble-free performance. Get our estimate.

SPURS TO 72" PD. 1 DP
BEVELS TO 54" PD. 1 DP
SPIRAL, HELICAL and WORM GEARS TO 48" PD. 2 DP
CONTINUOUS TOOTH HERRINGBONE TO 60" PD. 2 DP
SPROCKETS TO 72" PD. 2½" CP
RACKS TO 20 FT. LONG. 3 DP
SILENT GEARS. RAWHIDE, BAKELITE, FIBROID
HEAT TREATED CASE OR FLAME HARDENED GEARS— OF CARBON OR ALLOY STEEL

Stahl
GEAR & MACHINE COMPANY
3901 HAMILTON AVENUE
CLEVELAND 14, OHIO

CIRCLE 318 READER SERVICE CARD

RANDALL and STICKNEY Dial Gauges and Indicators

are accurate, reliable and built to stand hard usage.

Model "C 50 B" has a 2¼" overall diameter, balanced dial 0-25-0 with .0005" graduations, ½" range and movable dial easily set at zero.

The cases on all R. & S. Gauges are made from sturdy castings. The case and plate are two separate units so that repairs can be made easily.

This style instrument can be furnished with various dials, graduations and ranges, in both English and Metric. There is an R. & S. Gauge for practically every purpose. Write for circulars describing our complete line.

FRANK E. RANDALL CO., INC.
145 Ash St.
Waltham 54, Mass., U.S.A.
Makers of Dial Gages Since 1896

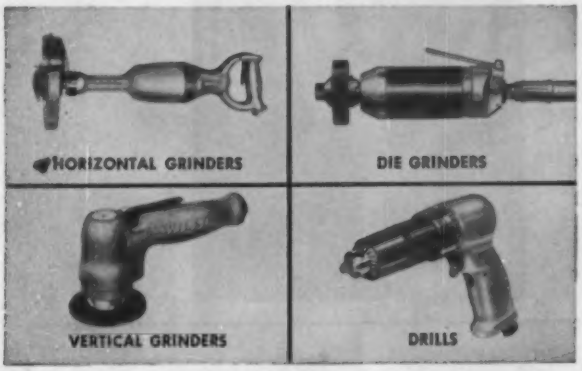
Popular package is 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.

Write for sample on company letterhead

THE DYKEM COMPANY
2301B North 11th St. • St. Louis 6, Mo.

CIRCLE 320 READER SERVICE CARD

WILSON PORTABLE PNEUMATIC TOOLS



Lightweight • Powerful • Compact

All Wilson portable pneumatic production tools are designed for easy handling. These lightweight, compact tools are production time savers on a wide range of work. Catalog PT-58 gives all the facts. Write for your copy.

TW906

THOMAS C. WILSON, INC.
21-11 44th Avenue, Long Island City 1, New York
BETTER TOOLS FOR BETTER WORK

EXPLOSIVE FORMING

Here is a detailed report on the theory and practice of explosive metal forming, a new and not-yet-exact science that forms metal to die shape by explosive impact.

Techniques (free forming, bulkhead forming and cylinder forming) are detailed in four articles from four major sources; one on general theory, one on aircraft applications, one on tubes and one on cups . . .

Fully illustrated, 12 pages — 30¢ each

READER SERVICE DEPARTMENT

American Machinist / Metalworking Manufacturing

330 West 42nd Street, New York 36, N. Y.

Heppenstall Forgings meet rigid specifications of world's largest Klystron project

When an important military radar program needed a large power amplifier, Varian Associates were asked to deliver one in record time. For the precision forgings required–delivered on time–Varian turned to Heppenstall. In a record-breaking five months, a successful prototype of the VA-842 Klystron was delivered to the Transmitter Manufacturer. In the company's words, "The speed and efficiency of the VA-842 program was due almost entirely to the complete cooperation between all areas of the company and outside contractors." *For delivery and dependability . . . why don't YOU investigate Heppenstall Forgings!*

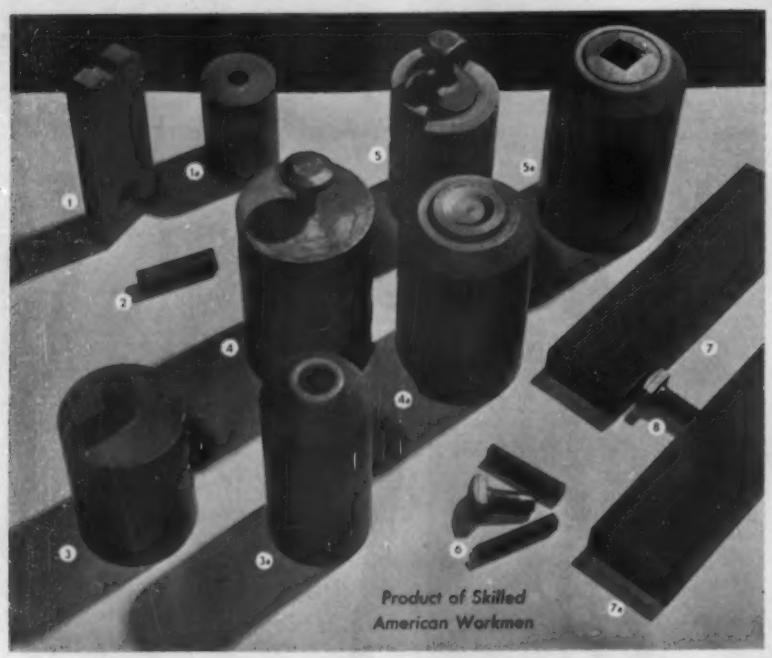
Made by Varian Associates, Palo Alto, California, this 12-foot, 900-pound Klystron produces tremendously high average power for long pulse radar.

HEPPENSTALL COMPANY
PITTSBURGH 1, PENNSYLVANIA
Plants: Pittsburgh, Pa. • Bridgeport, Conn. • New Brighton, Pa.

MIDVALE–HEPPENSTALL COMPANY
NICETOWN, PHILADELPHIA 40, PA.

Die Blocks • Forgings • Back-Up Roll Sleeves • Rings • Industrial Knives • Materials Handling Equipment
Pressure Vessels • Hardened and Ground Steel Rolls • Vacuum and Consumable Electrode Melted Steels

COLUMBIA TOOL STEELS



TOOL STEELS IN USE: Tooling for fully automatic cold heading of bolts.

1 — Cut-off blade COLUMBIA EXTRA carbon tool steel
1a — Cutter plug COLUMBIA EXTRA HEADERDIE
2 — Bolt blank as cut off ready for heading
3 — First station die COLUMBIA EXTRA HEADERDIE body with MOLITE HW10 insert
3a — First station upsetter COLUMBIA EXTRA HEADERDIE
4 — Second station die COLUMBIA EXTRA HEADERDIE body with MOLITE HW10 insert
4a — Second station hammer COLUMBIA EXTRA HEADERDIE body with MOLITE HW10 insert
5 — Trim punch E-Z-DIE air hardening steel
5a — Trim die COLUMBIA EXTRA HEADERDIE with low carbon 18-4-1 high speed steel insert
6 — Pointers MAXITE super high speed steel
7 & 7a — Roll thread dies ATMODIE air hardening high carbon high chromium steel
8 — Finished Bolt

COLUMBIA TOOL STEEL COMPANY
420 Lincoln Highway
Chicago Heights, Illinois

CIRCLE 324 READER SERVICE CARD

VICE PRESIDENT

Expansion requires this new appointment to Sykes Machine & Gear Corporation, U. S. subsidiary of W. E. Sykes Limited, leading British Machine Tool maker of high quality, high precision machines and tools. Position demands integrity, initiative and the ability to lead a team of experts now selling and servicing in the United States and Canada, Gear producing machines and Large Plano Milling machines (made by Associated Company Kendall & Gent Ltd.). Appointment will be offered to the man, about 40, who has knowledge of Gear Techniques, experience of Machine Tools and can prove success in sales management. Generous terms commensurate with high standard of ability and experience expected.

Interviews will take place in the United States at the end of October. Write in confidence before 15th October to the Company's Accountants, Peat Marwick, Mitchell & Company, 744 Broad Street, Newark 2, N. J., with details of age, experience in the last three positions with salaries earned.

Miniature END MILLS

Woodruff & Stokes now offers end mills in a variety of sizes up to 0.125-inch maximum. All end mills are two-flute, right-hand spiral, and will be ground to any desired diameter. These tools are made of M-2 type high speed steel. Perfect concentricity is maintained between shank and cutting diameters. The diameter of the cutting end can be held to a tolerance of ±.0001. Delivery approximately 2 to 4 days.

For complete information on the special tool design services of Woodruff & Stokes, write to:

WOODRUFF & STOKES CO.

CIRCLE 327 READER SERVICE CARD

FASTENING DEVICES

This special report summarizes typical mechanical fastening devices and will help you select a fastener that wil lead to a more dependable and economical product. Sixteen pages, fuly illustrated—35c per copy.

Reader Service Dept.
American Machinist \ Metalworking Manufacturing
330 W. 42 Street
New York 36, N. Y.

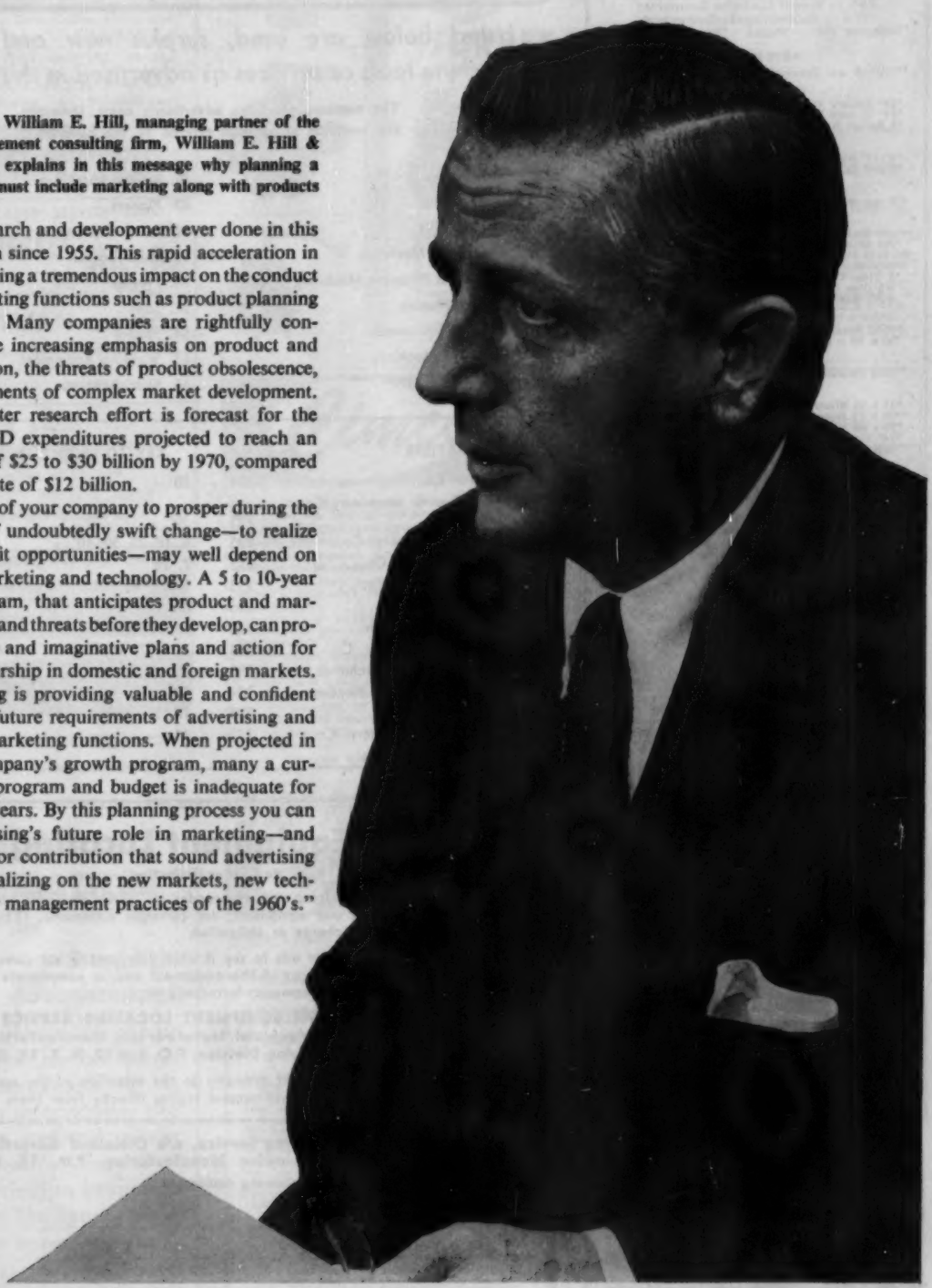
"Long-range planning for advertising?"

"Certainly," says William E. Hill, managing partner of the New York management consulting firm, William E. Hill & Company, and he explains in this message why planning a company's future must include marketing along with products and processes.

"Half the research and development ever done in this country has been since 1955. This rapid acceleration in technology is having a tremendous impact on the conduct of specific marketing functions such as product planning and advertising. Many companies are rightfully concerned about the increasing emphasis on product and process innovation, the threats of product obsolescence, and the requirements of complex market development. And still a greater research effort is forecast for the 1960's, with R&D expenditures projected to reach an estimated level of $25 to $30 billion by 1970, compared with a present rate of $12 billion.

"The capacity of your company to prosper during the next ten years of undoubtedly swift change—to realize the period's profit opportunities—may well depend on your creative marketing and technology. A 5 to 10-year long-range program, that anticipates product and market opportunities and threats before they develop, can provide the advance and imaginative plans and action for competitive leadership in domestic and foreign markets.

"Such planning is providing valuable and confident insight into the future requirements of advertising and its companion marketing functions. When projected in relation to a company's growth program, many a current advertising program and budget is inadequate for the next 5 to 10 years. By this planning process you can optimize advertising's future role in marketing—and establish the major contribution that sound advertising can play in capitalizing on the new markets, new technologies and new management practices of the 1960's."



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MACHINE TOOLS— FOR SALE

RBG = Rebuilt Condition Guaranteed
RCG = Reconditioned—Guaranteed
*Indicates 1940+ Model **Indicates 1950+

AUTOMATICS

**3½"—6 spdl Cocomatic w/Thrdg.

BORING MILLS

*24" Bullard VTL w/Side Head RBG
*74" Bullard "Cutmaster" VTL Excel. RCG
*4 Sellers Horiz. Tbl. Type (1942)

DRILLS, RADIAL

*6'x11" Amer. "H. Wizard" Tbl. (1943)
*5'x11' Carlston #4 MT, Ser. 1A1418

DUPLEX BROACH

**8 ton—42" Cinc. Vert. Hydro (1950) RBG

GRINDERS, MISC.

**180 Sheffield, Multiform (1957) Like New
*100 Bryant Int. New Spdl. (1947) RBG.
**10x24 #4BGI Van Norman 15° Angle Head (1950)
**20 x 48 Landis CHW Ext Like New
*2 Cinc. Centerless, Hydr Profile Dresser RBG
#8 Cinc Centerless w/Hydr Dressers 8" cap RCG
#271 Heald Sizematic Internal Ser 34000

GRINDERS, SURFACE

*16A2 Blanchard 2 spdl. autom. Sz'g. (1948)
*30 x 36 x 120" Thompson Horiz. Hydr. (1948)

JIG BORER

*1830 Clearman, 1000 RPM, R&I Ser CJB187

LATHES

*12 x 20 Rivett 1020, T.R. Model (1950) RBG.
**20 x 72 Monarch Tracer, Thrdg., etc. RBG
*90 x 96 Niles "Timesaver" T.A. SJ, 4J RBG
*74" Star "T" Lathe, 15 HP Like New
**30H Bullard Monotrol 3 Spdl, Ser. 28104

LATHES, TURRET

*#3 Gisholt, Barfaed, 1948, Excel.
**#3 J&L, Hard. Ways, Assess (1951)
**3A W&S with Assess. (1950) & (1943)

MILLS

**SE30 Mammut (German) Horiz. H.D. (1953)
**V-20 Mammut (German) Vert. H.D. Univ. (1954)
**#4 Cinc. Vert. H. Speed Dial Type (1954)
*#3 Gorton Vert. 4000 RPM RBG
**#6CK K&T Horiz 18x108 Tbl. 25 HP (1958) RBG
**#3—2448 Sundstrand Rigidmill 15 HP (1952)
*#3—1448 Sundstrand 600 RPM (1944)
*#4-48 Cinc. Hydrom., R & F Tracer, RCG
*36 x 96 Cinc. Hydrom., Simplex RCG
*26-60 Cinc I Spdl Vert Hydrotel, RCG

MILLS, 3 DIMENSION

5' x 5' x 14' converted planer type, Rblt. Cond.
4' x 4' x 12' converted planer type, Rblt. Cond.

PRESSES

**65 Ton Federal OBI 4" Str., Air B—RCG
*110 Ton AS Ning. OBI, 6" Str RBG
*300 ton Verson Hydr. 44x60 bed, 28" str., 125 HP

SAWS

*28" DoAll Vert. Bandsaw W/Welder
**36" DoAll H.S. Vert. Bandsaw, Hydr. Tbl (1959)

SHEARS

*13' x 10 Ga. Niagara, F & B Gage, Clean

WELDERS

**75 KVA Sciaky Spot 3 phase w/controls
**75 KVA National Circular 18" Thr 440 V.
**100 KVA Thompson #LSS, Longitudinal 440 V.

"MIDWESTERN"
Machinery Company
2900 Pleasant TA 5-4461 Mpls 8, Minn.

CIRCLE 601 READER SERVICE CARD

DECIMAL DRILLS
DRILL BLANKS
REAMER BLANKS in
Steps of .001"

HAYDEN TWIST DRILL SALES CO.
25205 Ryan Rd., Warren, Mich.

CIRCLE 602 READER SERVICE CARD

OVER 1,000 NEW AND USED
MACHINE TOOLS IN STOCK
WRITE FOR LATEST STOCK LIST

MILES MACHINERY COMPANY

2039 EAST GENESEE • SAGINAW, MICH. PL 7-3105

CIRCLE 603 READER SERVICE CARD

FOR SALE
POTTER & JOHNSON ±5D
POWER-FLEX AUTOMATIC TURRET LATHES

Late type with 15 HP motors, complete with chucks & tooling. Excellent condition, can be seen in operation. Priced for quick sale.

ACME GEAR COMPANY, INC.
129 Coolidge Ave., Englewood, N.J. LO 8-2245

CIRCLE 604 READER SERVICE CARD

SEARCHLIGHT SECTION
ADVERTISERS' INDEX AND BUYERS' REFERENCE

Listed below are used, surplus new and rebuilt machine tools or services as advertised in this section.

The numbers after the advertiser's name, indicates the products or services offered by the advertiser.

1. Accessories
2. Automatics
6. Boring Mills
7. Broaching Machines
16. Drilling & Reaming Machines
17 Electric Motors
21. Forging Equipment
25. Grinding Machines
30. Lathes
36. Milling Machines
40. Planers
42. Power Equipment
43. Press Brakes
44. Presses
51. Saws
54. Shears
63. Welding Equipment
66. Miscellaneous

ADVERTISER	Page No.	KEY TO PRODUCTS OR SERVICES
Acme Gear Co., Inc.	234	30
Andrews Tool & Machinery Co., Edward	235	30
Cincinnati Machinery Co.	235	6, 16, 25, 30, 40
Eastern Machinery Co.	235	7, 16
Electric Equipment Co.	235	1, 17, 42, 63
Globe Trading Co.	235	66
Hyman & Sons, Joseph	235	43, 44, 54
Midwestern Machinery Co.	234	2, 6, 7, 16, 25, 30, 36, 44, 51, 54 63
National Machinery Exchange	235	30, 44
Twist Drill Sales Co., Hayden	234	16
Wender Presses, Inc.	235	16, 21, 44
Wigglesworth Machinery Co.	235	44

SEARCHLIGHT Equipment Locating SERVICE

"No Cost or Obligation"

This service is aimed at helping you, the reader of "SEARCHLIGHT," to locate rebuilt and used machine tools and equipment, not currently advertised. (This service is for USER-BUYERS only.) No charge or obligation.

How to use: Check the dealer ads to see if what you want is not currently advertised. If not, send us the specifications of the equipment and/or components wanted on the coupon below, or on your own company letterhead to

SEARCHLIGHT EQUIPMENT LOCATING SERVICE
c/o American Machinist/Metalworking Manufacturing
Classified Advertising Division, P.O. Box 12, N. Y. 36, N. Y.

Your requirements will be brought promptly to the attention of the equipment dealers advertising in this section. You will receive replies directly from them.

Searchlight Equipment Locating Service, c/o Classified Advertising American Machinist/Metalworking Manufacturing, P.O. 12, N.Y. 36, N.Y.

Please help us locate the following equipment:

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NAME.....

TITLE..... COMPANY.....

STREET.....

CITY..... ZONE..... STATE.....

10/3/60

IMMEDIATE DELIVERY

2—#5 MINSTER HIGH SPEED O.B.I. BLANKING PRESSES, 45 ton, Flywheel type, 1¼" stroke, 5 HP Varidrives, Speed range 150-300 SPM. Equipped with #4-6 Perfecto Double Roll Feed and Scrap Cutter. Never used.
PRICE: F.O.B. East Boston.....$11,076.00 each

2—#6 MINSTER O.B.I. PRESSES, 60 ton, Geared type, 7" stroke, 12" shutheight, 7½ HP Varidrives, 40-80 SPM. Never used.
PRICE F.O.B. East Boston .....$9500.00 each

WIGGLESWORTH MACHINERY COMPANY
60 Border St., East Boston, Mass.

CIRCLE 610 READER SERVICE CARD

BRAKES PRESSES SHEARS

Will Lease or Furnish Long Terms

JOSEPH HYMAN & SONS
2600 E. Tioga St., Philadelphia 34, Pa.

CIRCLE 611 READER SERVICE CARD

FOR SALE

JACKSON & CHURCH AUTOCLAVE
Vacuum Impregnator—Jacketed
54" x 72" — 150,000 Cu. Inch
Almost New

GLOBE TRADING COMPANY
1815 Franklin St., Detroit 7, Mich.

CIRCLE 612 READER SERVICE CARD

MOTORS • GENERATORS
TRANSFORMERS
NEW • REBUILT
ELECTRIC EQUIPMENT CO.
WORLD'S LARGEST INVENTORY
CALL COLLECT GL 3-6783
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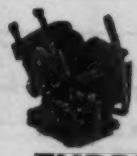

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24" x 72" Sidney G.L. lathe, 16 speeds, Timken bearing, taper attachment.
10" x 48" Thompson Hydraulic Surface Grinder, late type, AC motor.
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4A Warner & Swasey Saddle Type Turret Lathe, 24" 3 jaw chuck, 8¼" hole in spindle.

Cincinnati Machinery COMPANY

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No. 2 Avey, m.d.
No. 2LMS Leland & Gifford, m.d., H.S.
No. 2LMS Leland & Gifford, single spindle, m.d., H.S.
No. 4BM Foodick, single spindle H.S., m.d.
No. 4MS Leland & Gifford H.S., 4 speed A.C. m.d. to spindle
1 spindle No. 2MA6 H.S. Type B, m.d., Avey, 7½" overhang, 1943
2 spindle Allen, belted m.d., 8" overhang
2 spindle No. 2 Avey H.S., belted m.d.
2 spindle No. 2BMA 1 Avey Production Type, m.d.
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2 spindle No. 2 Leland & Gifford H.S., 8" overhang, m.d.
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American Machinist / Metalworking Manufacturing

Reader Service Department
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INDEX TO ADVERTISERS

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	Page
Accurate Bushing Company	167
Acromark Company	220
Allegheny Ludlum Steel Corporation	44
Allis-Chalmers Manufacturing Company	205
Allison-Campbell Division American Chain & Cable Co., Inc.	223
Aluminum Company of America	26-27
American Chain & Cable Company, Inc. Allison-Campbell Div.	223
Wilson Mechanical Instrument Division	198
American Optical Company	173
American Saw & Manufacturing Company	210-211
American Tool Works Company	69
American Twist Drill Company	176
Anchor Chemical Company	222
Armco Steel Corporation	92
Armstrong Blum Manufacturing Company	35
Armstrong Brothers Tool Company	52
Association of Industrial Advertisers	233
Atlas Press Company Clausing Div.	225
Austin Industrial Corporation	204
Avey Division of Motch & Merryweather Company	48
Bardons & Oliver, Inc.	150
Baush Machine Tool Company	163
Bearing, Inc.	197
Beaver Pipe Tools, Inc. Abrasive Machine Division	206
Bellows-Valvair Div. of IBEC	66-67
Berthiez	53
Bethlehem Steel Company	65
Blanchard Machine Company	224
Bunting Brass & Bronze Company	213
Burg Tool Manufacturing Company, Inc.	22-23
Capewell Manufacturing Company	55
Carborundum Company	184-185
Card Division, S. W. Union Twist Drill Company	28
Carpenter Steel Company	152
Cincinnati Gilbert Machine Tool Company	45
Cincinnati Lathe & Tool Company	40-41
Cincinnati Milling Machine Company Milling Machine Division	5, 6-7
Cincinnati Milling Machine Company Cincinnati Milling Products Div.	47
Cincinnati Shaper Company	49
Clark-Cutler-McDermott Company	178

ADVERTISERS INDEX

	Page
Clausing Division Atlas Press Co.	225
Cleveland Automatic Machine Company	78
Columbia-Geneva Steel	37-39, 62
Columbia Tool Steel Company	232
Copperweld Steel Company	138
Crane Packing Company	171
Crucible Steel Company of America	16
Danly Machine Specialties, Inc.	91
Dayton Perforators, Inc.	193, 194
Detrex Chemical Industries, Inc.	214
Dixie Bearings, Inc.	197
Dreis & Krump Manufacturing Company	180
Dykem Company	230
Eastman Kodak Company Industrial X-Ray	177
Eldorado Tool & Manufacturing Corp.	216
Emhart Manufacturing Company	208
Engis Equipment Co.	212
Erickson Tool Company	64
Ex-Cell-O Corporation	82
Farval Division Eaton Manufacturing Co.	186
Fellows Gear Shaper Company	8-9
Ferguson Machine Corporation Sub. of Universal Match Corporation	217
Finkl & Sons Company, A.	196
Fiske Brothers Refining Company Lubriplate Division	210
Foote-Burt Company	221
Frauenthal Division Kaydon Engineering Corporation	30-31
Gardner Machine Company	17
Gates Rubber Company	226
Gear Specialties, Inc.	94
General Electric Company	222
General Radio Company	136
Gisholt Machine Company	50
Goss & de Leeuw Machine Company	202
Grant Manufacturing & Machine Company	222
Gray Company, G. A.	20-21
Greenfield Tap & Die Corporation	51
Hammond Machinery Builders	228
Hardinge Brothers, Inc.	59
Heald Machine Company Sub. Cincinnati Milling Machine Co.	2nd Cover
Heppenstall Company	231
Ideal Industries, Inc.	192
Ingersoll Milling Machine Company	54
Jacobs Manufacturing Company	179
Jones & Lamson Machine Company	46
Lahr Machine & Tool Company	222
Landis Machine Company	10-11
Landis Tool Company	12-13
Lavallee & Ide, Inc.	70
Lees-Bradner Company	189
Leland-Gifford Company	71
Linde Company, Division Union Carbide Corporation	141, 142
Lubriplate Division Fiske Brothers Refining Co.	210
Lufkin Rule Company	84
Master Electric Co. Div. Reliance Electric Engineering Co.	57, 58
Mattison Machine Works	3rd Cover
McGraw-Hill Book Co.	220
Metal Carbides Corporation	209
Metallurgical Products Dept., General Electric Company	86
Michigan Special Machine Company	63
Micrometrical Manufacturing Company	200
Mimik Tracer, Inc.	195
Minneapolis-Honeywell Machine Control Group	154
Minster Machine Company	203
Mobil Oil Company	14-15
Mohawk Tools, Inc.	207
Moline Tool Company	198
Morse Twist Drill & Machine Company	88
National Acme Company	42-43
National Machinery Company	212
New Britain Machine Company New Britain Gridley Machinery Division	33, 34
Nicholson File Co.	219
Noble & Westbrook Manufacturing Co.	72
Norton Company	18-19, 36
O'Neil-Irwin Manufacturing Company	215
Orban Inc., Kurt	165
Racine Hydraulics & Machinery Inc.	218
Randall Company, Inc., Frank E.	230
Reed Rolled Thread Die Company	73
Reliance Electric & Engineering Co.	57, 58
Ren Plastics, Inc.	229
Rockwell Manufacturing Co. Walker Turner Division	201
Shore Instrument & Manufacturing Co.	236
Simonds Abrasive Company	32
Simpson Optical Manufacturing Company	220
S. K. F. Industries Inc.	199
Skinner Chuck Company	75, 76
Smith Corporation, A. O.	190-191
Snap-on Tools Corporation	188
Snow Manufacturing Company	175
Snyder Corporation	80
Stahl Gear & Machine Company	230
Sundstrand-American Broach	56
Sun Oil Company	161
Sykes Machine & Gear Corp.	232
Tennessee Coal & Iron	37-39, 62
Texaco, Inc.	60-61
Timken Roller Bearing Company Industrial Division	4th Cover
Tomkins-Johnson Company	133
Torrington Manufacturing Company	238
Union Twist Drill Company	29
United States Steel Company	37-39, 62
United States Steel Corporation	37-39, 62
United States Steel Supply	37-39, 62
United States Steel Export Company	37-39, 62
United States Tool Company, Inc.	134
Universal Cyclops Steel Corporation	68
Van Norman Machine Company Div. Van Norman Industries, Inc.	24-25
Vascolay Ramet Corp.	169
Walker Turner Division Rockwell Manufacturing Company	201
Westinghouse Electric Corporation	181-183
Wheel Trueing Tool Company	140
Whitman & Barnes, Inc.	159, 160
Wilson, Inc., K. R.	227
Wilson Inc., T. C.	230
Wilson Mechanical Instrument Division American Chain & Cable Co., Inc.	198
Woodruff & Stokes, Inc.	232
Woodworth Co., N. A.	74

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ADVERTISING SALES STAFF

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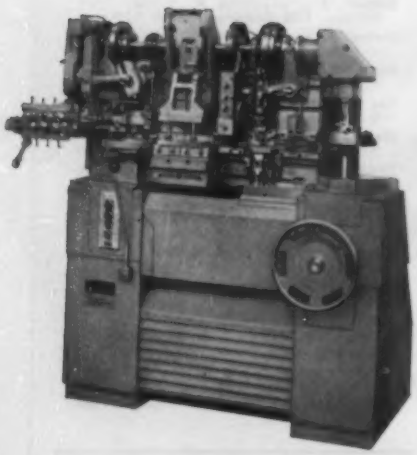

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1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50

NEW SHOP EQUIPMENT, MATERIALS, PARTS

51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77
78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103
104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124
125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145
146 147 148 149 150
540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560
561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581
582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600

ADVERTISEMENTS

151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166
167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187
188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208
209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224
225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245
246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266
267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287
288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308
309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329
330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350
351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371
372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392
393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413
414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434
435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455
456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476
477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497
498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518
519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539

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622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638

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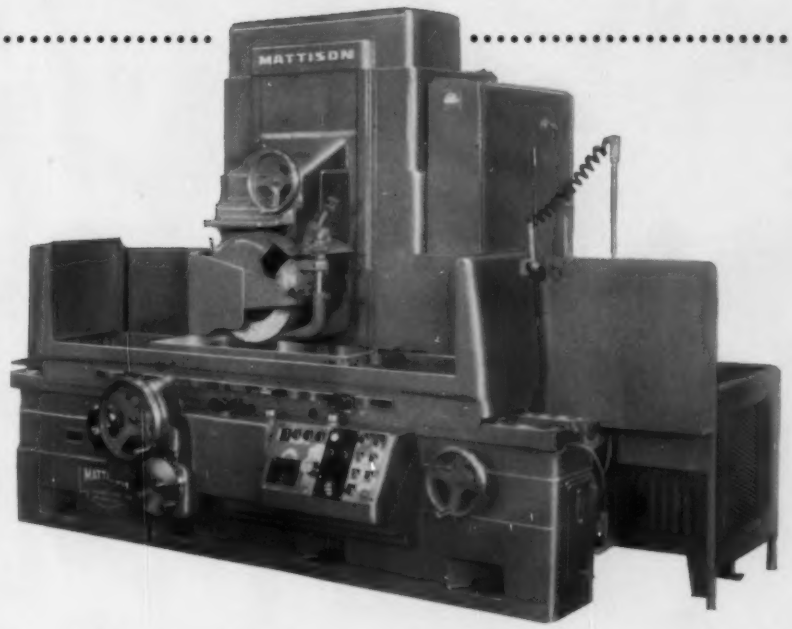
October 3, 1960
(this card expires December 5, 1960)

MATTISON
HIGH-POWERED PRECISION

GRINDING METHODS

New Mattison Horizontals speed precision surface grinding



Here is Mattison's new line of horizontal-spindle surface grinders, with more rigidity, more power actuation, and more automatic features to speed work and control your quality.

Here, in surface grinders ranging from 36″ to 192″ in table length, is all the precision you need for toolroom surface grinding, plus high production capacity for the shop. Here is "hogging" power and rigidity combined with high sensitivity of a light-duty machine tool.

Operation of the new Mattison is easier and more automatic because cross feed is electronically controlled in both directions. The operator just presets the feed increment and reversal points on the new illuminated station—the wheel slide automatically feeds and stops within ± 1/16″ of either edge without work stoppage. Twin cylinder actuation assures uniform speed of the cross slide. With optional automatic downfeed, electronic reversal makes grinding easier than ever.

Automatic cross feed resets after wheel dressing

Should the operator override the automatic feed to dress the wheel, simply releasing the manual lever causes wheel slide to reset itself to the correct direction and resume operation between preset reversal points.

On long grinding operations, Mattison's new power downfeed increases productivity greatly. Amount of downfeed is set to a predetermined stop, from .001″ to .400″, in increments of from .0002″ to .004″ in ranges. On plunge grinding operations, downfeed actuation can be controlled by table reversals. Or, when grinding in the conventional manner, it may be controlled from cross slide reversals. A microswitch shuts off the feed at a predetermined depth of cut, after which the machine sparks out. This new feature is optional on all new horizontals.

Box-type construction increases rigidity and sensitivity

Performance has proved the superiority of our double-column machine—and now the Meehanite columns, wheel slide, and spindle housing all are beefed up and functionally changed to bring you the finest double-column design ever. Wide, deep, box-type columns are bolted and doweled to the Meehanite base and reinforced at the top by a heavy connecting brace. This gives you rigidity of a one-piece casting. The 30″, 36″, and 42″ machines are standard equipped with hydraulic counterweighting. This permits you to preload the feed screw in either direction increasing control on precision work.

New system of ways and gibbing permits closer adjustment and accentuates the machine's sensitivity to fine-feed actuation.

Table speeds increased through variable volume pump

You can take advantage of high horsepower and rigidity because Mattison table speeds go up to 125 ft per minute, or more. The new style pump has internal hydraulic reversing, for quieter, smoother, and cooler operation. Complete hydraulic unit is isolated from the machine, avoiding heat build-up and possible distortion of the table or work.

Power assist simplifies manual control

A new auxiliary power system permits the operator to control table positioning more easily and precisely by hand instead of by jogging the hydraulic system. Optional power assist on large machines permits fingertip actuation through the handwheel, even when positioning a table load of heavy castings. This facilitates dressing the wheel from a table-mounted diamond or crush roll. All levers and handwheels on this machine are directional.

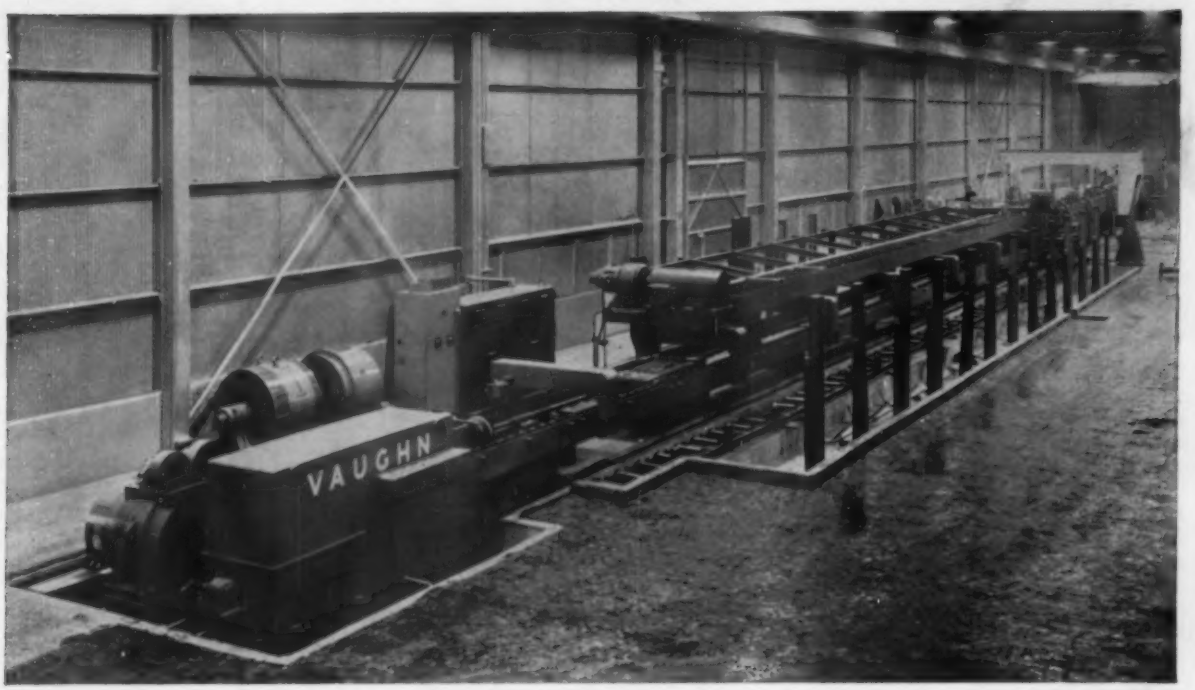
If you have large accurate parts . . . if you are a volume producer of precision-ground flat stock . . . or if you just want to increase productivity in the toolroom, contact your Mattison dealer for information on this new line of high-powered precision surface grinders.

MATTISON MACHINE WORKS
Rockford, Illinois Phone: WO 2-5521

MATTISON

HIGH-POWERED PRECISION SURFACE GRINDERS

Fastest draw in the West—
with Timken® bearings that don't creep



New in design, this record high-speed Vaughn Machinery Co. No. 3 drawbench draws tubing at 550 FPM in an Arizona metals plant. To take the high shock loads and prevent bearing cup creepage under the terrific acceleration loads, Vaughn engineers specified the new Timken® pin-cup tapered roller bearings for both ends of input, intermediate and output shafts in the main drive. Timken bearings hold shafts rigid, keep them concentric with their housings. Their tapered design means they take *both* radial and thrust loads or any combination. And in Timken pin-cup bearings, the cups have a specially designed hole for positive lubrication and pinning them against rotation to prevent cup creepage. Result is elimination of housing wear, assurance of proper gear mesh, reduced maintenance —*savings* any way you look at it.

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SPECIAL SOUND-TESTING EQUIPMENT makes sure Timken bearings *sound* good, too — so they'll run quieter, give long life with minimum maintenance.

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